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October 27, 2011

To: **U.S. Nuclear Regulatory Commission (NRC)**

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From: **The Alliance For A Clean Environment (ACE)**

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RULES AND DIRECTIVES
SECTION 101
10/27/11

PART 2 - SECTIONS 12 THROUGH 14

Official On-The-Record Public Hearing Testimony For:

Limerick Nuclear Power Plant

License Renewal

NRC I.D. Docket 2011-0166

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Add = L. Regner (LNR2)*

LIMERICK NUCLEAR PLANT'S RADIOACTIVE WASTES

**THIS REPORT SHOWS WHY
THE BEST SOLUTION IS TO:**

CLOSE LIMERICK

**AND STOP MAKING DEADLY WASTE
FOR WHICH THERE'S
"NO" SAFE SOLUTION**

**DETAILED INFORMATION IN THIS REPORT ON EACH OF THE FOLLOWING
SHOWS WHY ALL ARE UNACCEPTABLE UNPRECEDENTED THREATS
TO OUR ENVIRONMENT, PUBLIC HEALTH, AND OUR ECONOMY:**

- 1. "SPENT FUEL" POOLS**
- 2. DRY CASK STORAGE**
- 3. TRANSPORTATION**
- 4. REPROCESSING**

WASTE ALREADY PRODUCED NEEDS TO BE STORED ON SITE SAFER

Limerick Nuclear Plant's radioactive wastes are a major threat to public safety and the economy.

The more we learn about Limerick's dangerous deadly wastes, the more we see that the only logical solution is to stop making it.

Without full disclosure or our consent, Limerick turned our region into a dangerous defacto high-level radioactive waste dump.

LIMERICK - A DEFACTO RADIOACTIVE WASTE DUMP, LIKELY FOREVER.

Limerick's deadly radioactive wastes will remain a threat to human health and the environment for an extraordinary length of time. They will likely remain on site in our region forever.

- Evidence shows there is no safe way to store, transport, or recycle (reprocess) Limerick's high-level radioactive wastes. All seriously jeopardize our region. These deadly wastes are vulnerable to terrorists attacks causing unstoppable fires and natural disasters like earthquakes causing loss of water or ability to cool wastes in casks.

All Limerick's deadly high-level radioactive wastes produced since Limerick started operating in 1985, remain on site at Limerick Nuclear Power Plant.

- EPA set a million year health standard for a nuclear dump such as we have in our backyard.
- Most waste is stored in vulnerable jam-packed fuel pools, similar in design to those at Fukushima. Only Limerick's contain far more waste.
- Now that Limerick fuel pools are full, the high-level radioactive wastes are even being stored above ground in casks.
- Some radionuclides in Limerick's deceptively named "spent fuel" remain deadly for millions of years, while cask containers storing wastes above ground are "expected" to last only hundreds of years.

LIMERICK'S RADIOACTIVE WASTES CAN BE TURNED INTO WEAPONS OF MASS DESTRUCTION

- A terrorist attack on Limerick's vulnerable fuel pools could result in the radioactive consequences of 100 Hiroshima or Nagasaki bombs.
- The devastating unstoppable fire in the fuel pool at Fukushima shows just what can happen.
- See attached details for estimated impacts.

What happens in the event of a natural disaster, or eventual inevitable leaking as a result of the breakdown of the materials storing Limerick's deadly radioactive fuel rods?

- We could have an unstoppable fire in the fuel pools like we are witnessing in Japan.
- Ground water and surface water could become so contaminated with radiation, it would be unable to be safely used.
- How could it possibly be cleaned up? Who will pay to try?

FINANCIAL INJUSTICE

- As ratepayers and taxpayers Exelon expects the public to pay to store Limerick's deadly wastes forever. As part of a nuclear industry legal settlement against taxpayers over nuclear waste, Exelon received \$300 hundred million of our money until 2010 and \$600 million until 2015, just to deal with storing its own waste.
- Exelon avoids liability insurance costs - we could pay over \$1 TRILLION in the event of a terrorist attack or disaster at Limerick.

As long as Limerick continues to operate more of this dangerous and deadly waste will be produced. For this reason alone, Limerick should be closed, NOT relicensed.

Limerick Nuclear Plant's Radioactive Fuel Rods Are Among The DEADLIEST MATERIALS ON EARTH

Estimated Spent Fuel Stored At Limerick

- **1,143 Tons**
- **6,203 Total Assemblies**

**As Long As Limerick Continues To Operate, As Much As
40 TONS More Could Be Produced Every Year**

This Deadly Radioactive Waste Makes Limerick A Ticking Time Bomb

➤ Limerick's Densely Packed Fuel Pools Are Vulnerable

Most of the deadly radioactive wastes produced since 1985 when Limerick started operating are stored in Limerick's fuel pools.

Limerick's design is similar to reactors at Fukushima with roof-top fuel pools highly vulnerable to loss of power and cooling water from an earthquake or other natural disasters, in addition to a variety of attacks by terrorists.

With loss of cooling water, Limerick's fuel rods can heat up, self-ignite, and burn in an unstoppable fire, causing tens of thousands of deaths up to 500 miles away, according to a 2000 NRC study.

➤ There is no safe solution for Limerick's Deadly Wastes

1. Storing it on site in casks is also very risky. It jeopardizes our future. Containers are only expected to last 50 years, while waste stays dangerous for hundreds of thousands of years. There is no past history proving rods will be able to be removed from the casks safely. Attached details explain major corrosion concerns.
2. Transporting this deadly waste puts everyone in our region and along the transportation route at severe risk from truck and train accidents and/or terrorists attacks. Summary issues attached.
3. Reprocessing is even more of a threat to the environment and public health. See details.

Radioactive Fuel Rods Are Stored On-Site At Limerick Nuclear Plant In Pools and Above-Ground Casks

- **Limerick's Fuel Rods Are Vulnerable To Fire and Terrorist Attacks.**
- **Over 1,000 Metric Tons Are Stored On The Limerick Site.
(Enough To Create A Disaster 100 Times Worse Than Hiroshima)**
- **As Long As Limerick Nuclear Plants Operates, This Dangerous
Deadly Fuel Rod Storage Will Increase.**

Experts Warned Spent Fuel Pools Are At High Risk From Loss of Water.

- Spent Fuel Pools Are Vulnerable To Attack - According to a January 2003 study by Dr. Thompson, Director of the Institute for Resource and Security Studies entitled, "Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security".
- Gordon Thompson, an international authority on the issue explained: In the event of a water loss, the spent fuel rods will "heat up, self-ignite and burn in an unstoppable fire."
- The zirconium cladding can trigger an exothermic reaction and fire, which can burn away the cooling water.

Fuel Rods In Pools At Limerick Risk Loss Of Water From A Fire Because:

- NRC didn't require Limerick to follow the safest fire safety regulations. NRC made a second set of standards followed by Limerick, determined to be "safe enough". That is not acceptable, given the consequences of a fire involving Limerick's fuel rods stored in pools.
- The pools are vulnerable to a 9/11 type terrorist attack and fire from jet fuel. NRC is failing to require Exelon to guard against this type of attack at Limerick.
- We need the most stringent precautions. Dr. Thompson concluded **a nuclear fire in the spent fuel pool (of Indian Point Unit 2) would: Release Enough Cesium-137 "To Render About 95,000 Square Kilometers Of Land Uninhabitable,"** (covering about 75% of New York. Similar distance would be true here.)

Fuel Rods Stored In Above Ground Casks Are Also At Risk From Fire and Attack.

- NRC is allowing Limerick to remove hot radioactive rods from Limerick's fuel pools far sooner than the 5-year cooling pool time, originally required by NRC.
- Casks are also vulnerable to a missile or even fire from fuel from an air strike. Still NRC failed to require Exelon to guard against this type of attack at Limerick.

➤ **Precautionary Action Is Urgently Needed.**

A 2000 special report prepared by experts within the NRC and the Sandia National Laboratories (designated as an official NRC planning regulation in 2001) determined that:

- **A Catastrophic Meltdown In The Spent Fuel Pool Of A Nuclear Power Plant Could Cause Fatal Radiation-Induced Cancer In Thousands Of People As Far As 500 Miles From The Site.**

Spent Fuel Pools At High Risk From Loss of Cooling Water Due To:

- 1. Earthquake**
- 2. Reactor Failure**
- 3. Leakage**
- 4. Evaporation**
- 5. Explosion Inside or Outside Pool Building**
- 6. Terrorist Acts**
 - ✓ **Aircraft Impact**
 - ✓ **Siphoning**
 - ✓ **Pumping**
 - ✓ **Accidental or Deliberate Drop of Fuel In Transfer**

See: Spent Fuel Pools Pose A Danger

Associated Press - March 17, 2011

LIMERICK'S Are PACKED

- Spent Fuel In Pools Contain More Radioactivity Than Reactors
- Spent Fuel Rods Give Off Enough Radiation To Kill People In Seconds
- Pools Are At High Risk From Loss of Water Accidents

If Limerick's Fuel Pools Lose Water, Fuel Rods Can Heat and Melt Down

- Without Enough Cooling Water, Rods Outer Shell Can Ignite With Enough Force To Propel Deadly Long-Lived Radioactive Fuel Inside Over A Wide Area
- Radioactive Spent Fuel Rods Are As Dangerous In Spent-Fuel Pools As Fuel Rods Inside Reactor Vessels, Only Considerably MORE VULNERABLE.

➤ **The Release of Radiation From
Limerick's Fuel Pools Could Render
Our Entire Region Uninhabitable**

Health and Economic Impacts Of A Terrorist Attack On Spent Fuel Pools Like Limerick's

Limerick Nuclear Plant is a ticking time bomb. Especially vulnerable to aircraft penetration, Limerick's fuel pools can be turned into weapons of mass destruction. Still, Exelon has not been required to spend the money to guard Limerick against terrorist missiles or air strikes.

Large volumes (over 6,000 assemblies-1,000 tons), of Limerick's highly radioactive wastes (spent fuel rods) — are stored in densely packed fuel pools, elevated five stories above and outside the reinforced containment structure for the reactor.

Limerick's design is similar to reactors in meltdowns at Fukushima. Roof-top fuel pools are highly vulnerable to loss of power and cooling water from an earthquake or other natural disasters, in addition to a variety of attacks by terrorists. With loss of cooling water, Limerick's fuel rods can heat up, self-ignite, and burn in an unstoppable fire, causing tens of thousands of deaths up to 500 miles away, according to a 2000 NRC study.

A meltdown in a spent fuel pool could cause fatal radiation-induced cancer in thousands of people as far as 500 miles from the site.

A 2004 Study by Dr. Edwin Lyman, Senior Scientist at the Union of Concerned Scientists, Concluded:

- **As many as 44,000 near-term deaths from acute radiation poisoning**
- **518,000 long term deaths from cancer.**
- **Deaths could occur among people living as far as 60 miles downwind.**

A 2003 study by Dr. Frank Von Hippel, Director of Science and Global Security at Princeton University, concluded that:

- **A successful terrorist attack on a spent fuel storage pool could have consequences "significantly worse than Chernobyl."**
- **A catastrophic spent fuel fire could release a radiation plume that could contaminate 8 to 70 times more land than Chernobyl. (Would include the entire Philadelphia Metropolitan Region).**

A January 2003 study by Dr. Gordon Thompson, Director of the Institute for Resource and Security Studies (entitled "Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security") reviewed ways spent fuel pools are vulnerable to attack.

- **A nuclear fire in 1 spent fuel would release "render about 95,000 square kilometers of land uninhabitable," (would cover about 75% of New York State, and into, segments of NJ and CT.)**

Dry cask storage and transport are also very dangerous. It's time to close Limerick and stop producing such deadly waste for which there is no safe solution.

Spent Fuel Fire

Experts Say:

- **"A Spent Fuel Fire Can Contaminate 8 To 70 Times More Land Than Chernobyl"**
- **"Spent Fuel Must Be Seen As Pre-Deployed Radiological Weapons"**
- **With Loss of Water, Spent Fuel Rods "Heat Up, Self-Ignite And Burn in an Unstoppable Fire."**
- **"Zirconium Cladding - Can Trigger a Reaction and Fire Which Can Burn Away Cooling Water"**

Limerick's "Spent Fuel" Is Deadly **RADIATION DOSE**

From 1 YARD AWAY Unshielded (DOE 1st Report)

- ✓ **LETHAL DOSE**
Less Than 3 Minutes 500 REM
- ✓ **CANCER, GENETIC DAMAGE - SIGNIFICANT INCREASE**
Exposed For 30 seconds 100 REM

**EPA Set A MILLION-YEAR Health Standard
For Storage of Nuclear Waste Like That Stored At Limerick**

Deadly High Level Radioactive Wastes **Piling Up In Our Backyard In Above Ground Casks**

Limerick Nuclear Plant's deadly high-level radioactive wastes have all been stored in a fuel pool on site since Limerick started operating in 1985.

Pools are overflowing, a very dangerous situation, as we have seen in Fukushima. Since 2008, Limerick started removing the dangerous wastes from pools to place and store it in cement casks.

These deadly wastes will likely remain in our backyard forever, posing a serious threats to us and future generations. EPA set a million year health standard for high-level radioactive wastes.

We Were Warned By A Nuclear Engineer, About Design Flaws In Casks For Storing Limerick's High-Level Radioactive Wastes

- **NRC admits there were fabrication deficiencies in materials used for Limerick's canisters and concrete, refuses to call them flaws, and claims they were corrected.**
- **While the company was fined a nominal amount, in years to come, we could find cask design flaws could lead to a radioactive disaster.**
- Containers holding these deadly wastes are estimated to safely contain the waste for only 50 years, when the wastes remain deadly for hundreds of thousands of years. EPA set a million year health standard.
- In the case of a natural disaster like an earthquake, there is no proof that this deadly waste will be able to be removed safely. None have ever been removed after a long period of time.
- The earthquake in Virginia proved casks can be jarred and even moved. Casks at a nuclear plant 12 miles away were moved by the 8-11 earthquake.
- There are two faults near Limerick, one nine miles away. the other 17 miles away.

We believe there are issues with Limerick casks that could be a recipe for disaster.

- **UNDETECTED CORROSION**
- **FAULTY CONCRETE - DESIGN FLAWS**
- **EASY TERRORIST TARGET**
- **RADIOACTIVE EMISSIONS**
- **LAX NRC OVERSIGHT AND ENFORCEMENT**

CORROSION

Research validates ACE concerns about corrosion of steel storing deadly wastes at Limerick Nuclear Plant. No one knows how long it will take for nuclear waste storage containers to break down from corrosion and eventually leak – It is only a matter of time.

How long will it take for steel to corrode that holds high-level radioactive wastes above ground in our back yard at Limerick Nuclear Plant?

2005 NRC'S OWN STUDY FOUND PROBLEMS WITH CORROSION RATES OF METALS USED TO STORE NUCLEAR WASTE.

- **YET NRC STOPPED THE RESEARCH INSTEAD OF ADDRESSING THE CORROSIVE STEEL.**

Limerick's Independent Fuel Storage Installation was placed in service starting July 21, 2008.

PROVEN CORROSION CONCERNS

- 2006 Testimony to Congress by Public Citizen - Provided evidence of scientific misconduct by NRC and DOE related to corrosion rates of metals used to store nuclear wastes.
 - ✓ In 2005 NRC found problems with the corrosion rates of metals used to store nuclear waste, yet failed to address the corrosion problems.
 - ✓ Research identifying corrosion problems was stopped, not the use of steel that would corrode.
- 2006 NRC dismissed important evidence identified by ACE related to corrosion of steel planned to hold Limerick's high level radioactive wastes in above ground casks.
 - ✓ Every day Limerick adds 324 pounds of toxic chemicals to cooling tower waters. MSDS sheets identify 10 of them to be corrosive, some highly corrosive and some specifically corrosive to steel. There is NO FILTRATION to prevent corrosive chemicals from entering the air from cooling tower steam. Synergistic combinations of the corrosive additives can result in a serious corrosive threat to people and everything exposed to the drift from the cooling towers (35 to 42 million gallons every day), including steel holding deadly radioactive wastes stored inside casks that require cooling with outdoor air.
 - ✓ Corrosive air enters casks holding high-level radioactive waste rods stored in steel.
 - ✓ NRC admits corrosion will happen, yet dismissed ACE concerns without site specific testing of cooling tower emissions for specific and conversion corrosives. NRC's dismissive, misleading, and irresponsible conclusions defy logic. They can lead to irreparable disaster in our region.
- Corrosion can make it difficult, if not impossible, to move these extremely heavy casks. To date, there is no proof they can be moved safely after years of exposure to corrosive air.
- July, 2006 Areva, the company making Limerick casks, received a Notice of Violation, documenting specific problems with casks already in place, yet NRC allowed casks for Limerick to continue to be built by this company.
- November, 2006 in a whistle blower letter it was revealed that there were specific concerns about casks planned to be used at Limerick.
- In an 11/06 letter to ACE, both NRC and Transnuclear (Areva) admitted there would be corrosion and settling of ground beneath 40 ton casks.

NRC was negligent in failing to provide a risk assessment, including for terrorist attacks, related to above ground storage of high-level radioactive wastes at Limerick Nuclear Plant, one of the most heavily populated regions surrounding a nuclear plant.

➤ **ACE CALLS ON NRC TO PROVIDE A RISK ASSESMENT AS PART OF THIS UPDATED EIS.**

A U.S. Court of Appeals 9th Circuit decision forced NRC to assess the threat of a terrorist attack on above ground storage at the Diablo Canyon Nuclear Plant in California.

Similar threats exists at Limerick, yet NRC chose to interpret the 2006 court decision in a very narrow way. NRC inexplicably claimed an assessment was not necessary at Limerick. As usual, NRC dismissed the harmful health impacts from radiation exposure, inexplicably defying logic, claiming "a significant release of radiation affecting the public is "not reasonably expected to occur". This ignores the potential for rods overheating and combusting. Vast numbers of people live very close to Limerick, some less than one mile.

➤ **For This Updated EIS, ACE Asks NRC To Consider The Same Threats As Were Required At Diablo Canyon.**

- 1) The threat posed by a "land-based vehicle bomb."
- 2) A "ground assault with the use of an insider"
- 3) A "water-borne assault"
- 4) "A large aircraft impact similar in magnitude to the attacks of September 11, 2001."

➤ **Consider The Following Limerick Specific Issues For A Risk Assessment to be Included In Limerick's Updated EIS.**

- 1) Limerick is not guarded against airplane or missile attacks.
- 2) Nuke waste housing can be penetrated by missiles (proven by army testing).
- 3) **THREE AIRPORTS** are too close to Limerick Nuclear Plant.
 - ✓ Army testing proves missiles can penetrate casks.
 - ✓ Pilots take lessons at Limerick Airport, only 1 mile away.
 - ✓ Helicopters fly into the Limerick Airport from which missiles could be launched.
- 4) An industrial railroad runs through the nuclear plant site.
Industrial rail tracks run directly through the nuclear plant property, providing a way for terrorists to enter the site undetected.
- 5) A large portion of the site is bordered by the Schuylkill River.
Limerick Nuclear Plant property is bordered by the Schuylkill River (over a long distance), presenting a difficult, if not impossible challenge, for too few guards.
- 6) Too few guards have to cover Limerick's 600 acres.
- 7) Heavily populated region surrounds Limerick Nuclear Plant - Almost 8 Million people within 50 miles.

"Limerick's A Nuclear Waste Site"

"Limerick Could End Up a Nuclear Graveyard"

ACE Summary From Mercury Article By Erik Engquist 9-30-97

**These News Summaries Speak Volumes
They Showed PECO's Claims Were Wrong**

Limerick Did End Up As A Gigantic Extremely Dangerous Nuclear Graveyard

1. In 1971, PECO Energy President J.L. Everett said,
"If we ever decide we don't want radioactive wastes on earth, we have a simple solution. We can load them in rockets and shoot them into the sun."
 - The prospect of an explosion dispersing nuclear waste over millions of people killed the rocket idea.
 - Similar fates have befallen every other plan to dispose of nuclear power's spent fuel.
2. In 1971, PECO VP Vincent Boyer assured the community that;
"None of (Limerick's wastes) will be disposed of at the plant site."
 - The Mercury article said that the protracted search forced many Limerick advocates to eat his words, including PECO VP, Vincent Boyer.

In 1997, the Mercury reported that, 26 years later, the high-level radioactive waste is stored at Limerick and more than 75 other nuclear plants nationwide, although ratepayers have so far given the federal government \$13 billion to put it somewhere else. Pennsylvanians alone paid more than \$500 million.

"There's No Place to Send Deadly Spent Fuel Rods"

Limerick produces 30 TONS of high-level radioactive waste annually.

- It's stored on site underwater in concrete vaults lined with stainless steel.
- Spent fuel must be shielded by lead, steel, concrete or purified water.

Limerick will run out of space to store its high-level radioactive wastes by 2010.

- MacFarland said, *"The federal government's going to have a repository for us (before Limerick runs out of space in 2010). I firmly believe that."*
- A search for a nuclear waste dump went on since the 1960s. The Nuclear Waste Policy Act of 1982 formally called for the government to build depositories.
- In 1987, Congress targeted Yucca Mountain in Nevada with a projected opening date of 2010. Critics say earthquakes and volcanic activity make the site unsafe.

Limerick will need a dump site for the 50 tons of dry, low-level radioactive waste it produces each year.

- Limerick would have to store its dry waste temporarily on site. No municipality wants to host a proposed 500 acre low-level dump in PA when Limerick's low-level radioactive waste can no longer be shipped to South Carolina (closing 1994-95)

Jim Gaut, long-time Pottstown opponent, said,

"Whatever you've got to do with it, you've got to keep doing it for 10,000 years. No government has ever lasted that long. No civilization has ever lasted that long. It's such bare-faced arrogance to start off doing something when you simply aren't going to last long enough to take care of it."

Paul Gunter, director of Reactor Safety Projects for NIRS said in 1993,

"It's so highly radioactive, it will present a biological hazard for millions of years." Spent fuel administers a lethal dose of radiation within seconds.

NRC Jeopardizes Health and Safety Of Limerick Workers and The Public

Since 2006, when Exelon first tried to convince the public that cask storage was safe, NRC and Exelon repeatedly stated 5 years was required to safely remove fuel rods from Limerick's fuel pools, however that 's not what happened at Limerick - at least in 2010:

- ✓ **IMPORTANT POINT - The less cool down time in fuel pools, the thermally hotter and more radioactive the waste - the more risk of internal combustion and an unstoppable radioactive fire.**

Dry cask technical specifications state:

Radiation shielding and thermal heat removal require around 5 YEARS, minimum, cool down time in the pool before transfer to dry casks.

1. Yet, NRC claimed 1 year storage in the fuel pool at Limerick was sufficient before removal for above ground storage. (June 16, 2006, NRC letter to ACE)
2. NRC again clearly stated cool down time before removal from fuel pools was at least 5 years. (July 13, 2006 at a meeting in Limerick)
3. July 25, 2006 ACE received an e-mail from NRC stating: Cooling time in the pool is: 1 year or 3 years or 5 years. From: James Trapp - NRC Date: 07/25/06 07:04:34

In our letter to you dated June 16, 2006 we stated the time was at least 1 year. This statement was correct. I received the following information from Randy Hall that should help to clarify our statement..... Most spent fuel that is placed in dry storage must be aged for 5 years or more, as required by all NRC-approved Certificates of Compliance for dry cask storage systems.....Purposely using the word most, because there are cask designs, including NUHOMS, that would allow certain low-irradiated fuel to be placed in a cask with only 3 or more years of cooling in the spent fuel pool.

May 6, 2010 - An Exelon Employee At A Limerick Open House Said:

- **Older and newer "spent fuel rods" are removed from Limerick's fuel pools at the same time. Older rods are stored outside newer rods in assemblies.**

Is NRC Allowing Dangerous Fuel Rod Removal Too Soon At Limerick To Accommodate Exelon, At Increased Risk to the Region From An Unstoppable Radioactive Fire and Increased Risk To Workers?

NRC's 2002 Pamphlet Proves How Dangerous Nuclear Power Plant High-Level Radioactive Waste Is. Refer to:
U.S. NRC Washington, D.C. Office of Public Affairs Brochure
NUREG/BR-0216, Rev.2`May 2002 - Page 7 - How hazardous is high-level waste?

Standing near unshielded spent fuel could be fatal due to the high radiation levels.

TEN YEARS AFTER REMOVAL OF SPENT FUEL FROM A REACTOR:

**RADIATION DOSE 1 Meter Away From A Typical Spent Fuel Assembly
EXCEEDS 20,000 Rems Per Hour**

5,000 Rems Would Be Expected To Cause Immediate Incapacitation and Death within One Week

Exelon can remove fuel from pools to load dry casks more quickly, to free space in pools for more waste to be generated, but at what risk?

NRC Negligence In Allowing Limerick Nuclear Power Plant's High-Level Radioactive Waste To Be Removal From Pools Too Soon Is A Dangerous Experiment That Needs To Be Stopped At Limerick.

NRC should not allow Exelon to remove deadly waste from Limerick's fuel pools in less time than the 5-year requirement as recommended in NRC's own pamphlet and other fact sheets.– possibly as soon as 1 year.

- That raises the risk for radioactive fires and other disasters

Considering: 10 years after removal of spent fuel from a reactor:

- ✓ Radiation dose 1 meter away from a spent fuel assembly exceeds 20,000 Rems Per Hour
- ✓ 5,000 Rems would be expected to cause immediate incapacitation and death within 1 week.

Information From: NRC's own pamphlet NUREG/BR-0216, Rev.2 May 2002

211 Radioactive Poisons found in every 10-yr. old irradiated fuel bundle (Canadian Study)

- ✓ Polonium 210 – Just 1 of 211 – the type that poisoned Alexander Litvinenko in 2006
- ✓ An alpha emitted with the ability to become airborne with ease
- ✓ 1 Gram could poison 100 million people - Extremely dangerous in milligrams or micrograms
- ✓ Biological ½ life in humans 30 to 50 days
- ✓ Targets organs - liver and spleen
- ✓ Short-term exposure carries long-term risk of death from cancer

NRC Allows Risks To Increase For Radioactive Fire, When Allowing Limerick's Radioactive Spent Fuel Rods To Be Removed From Fuel Pools Too Soon

The Electric Power Research Institute estimates that the total cost of placing the nation's spent fuel older than 5 years [not less than 5 years] into dry casks at \$3.5 billion

- **Limerick's High-Level Radioactive Wastes Are Being Removed From Fuel Pools Years Sooner Than The 5 Years NRC Originally Required For Cooling Rods In Fuel Pools BEFORE Removal To Prevent Radioactive Fires.** NRC is allowing Exelon to remove Limerick's deadly high-level radioactive wastes from fuel pools years sooner than the 5-year time for cooling NRC's pamphlet and other information states is required to prevent overheating and radioactive fires.
- **May, 2010 at an Exelon meeting Exelon employees told us since 2008 rods were being removed in far less time than 5 years for cooling. That older rods have been placed on the outside of newer rods in the bundles when removed from the pools.**
- **This is a dangerous experimental departure from NRC's original requirement that rods could not be removed before 5 years of cooling. While allowing Exelon to fill up their pools faster, NRC's failure to follow their own rule could lead to a dangerous radioactive fire and disaster at Limerick.**

NRC needs to substantiate with research how this is safe, or be sure Limerick is following the 5-year rule.

EVIDENCE SHOWS THE LEAST BAD SOLUTION FOR LIMERICK NUCLEAR PLANT'S DANGEROUS, DEADLY RADIOACTIVE WASTE (SPENT FUEL) STOP MAKING IT - STORE IT SAFER ON-SITE

Detailed Summaries In The ACE Report to NRC for Limerick's EIS

1. Spent Fuel Pools - A Catastrophe Waiting To Happen
 - Large Volumes of Limerick's highly radioactive wastes are stored in Limerick fuel pools. They contain about 75% of spent fuel on site since Limerick started operating.
 - Pools are OVERLOADED with massive amounts of high-level radioactive waste rods. Wastes held in pools exceed design expectations.
 - Pools are filled with radioactive fluids that are threatening to boil away, introducing radiation into the air.
 - They are vulnerable to a 9/11 type terrorist attack with a plane or missile. That kind of attack could lead to an unstoppable radioactive fire which could impact people hundreds of miles away, according to an NRC study (2000).
 - Pools are outside the reinforced containment structures for the reactors.
 - An attack on U.S. spent fuel pools could result in an unstoppable radioactive fire, with potentially worse consequences than Chernobyl or Fukushima. There is so much waste in the pools.
2. Above Ground Casks
 - Threatened by natural disasters like earthquakes, tornadoes, and floods
 - If air flow vents get clogged for an extended period, rods can overheat and combust
 - Corrosion of steel holding wastes is a huge concern
 - Containers are expected to last 50 years - wastes stay dangerous over a million years
 - Likely to stay on site for decades, if not forever
 - How much of this deadly waste will be sitting in our back yard by 2029? 2049?
3. Transportation Risks - Too Deadly, Too Dangerous
 - Loading and Unloading
 - Presents extraordinary health, environmental, and financial risks on-site and along the route
 - Train and truck accidents of major concern, especially for fire from fuel
4. Reprocessing
 - Extremely polluting and risky
 - Increases volume of radioactive waste
 - Expensive for Taxpayers/Ratepayers
5. LLRW, Low-level, still high risk - Incineration increases threats

No Safe Solution - The Best Solution

- **Close Limerick Nuclear Plant when its license runs out in 2029, or sooner, and stop making this deadly high-level radioactive waste.**

There are about 1,143 TONS on Limerick's site right now.

By the time Limerick's current license expires that level will rise to 2,000 metric tons on site. That is more of this deadly waste than our future generations should have to live with in their back yard.

February 5, 2009

Comments To: **NRC Rulemaking**
73 FR 197-- 10/09/2008 Docket ID-2008-0482 and Docket ID-2008-0404

From: **The Alliance For A Clean Environment**
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The Alliance For A Clean Environment finds nothing reasonable about NRC's "reasonable assurances". NRC is failing to provide a realistic approach to protection or precaution related to the nuclear industry's deadly high-level radioactive wastes.

NRC's claim of "confidence" abandons both reality and precaution. NRC's "waste confidence decision" was never in the best interests of the public. NRC should not be "updating" its Waste Confidence Decision" with more misguided unprotective language, but instead taking a position to stop the production of massive amounts of high-level radioactive wastes for which there is no real safe solution.

With all that has happened and all we know 25 years after NRC's 1984 decision, NRC is showing callous disregard for the public's welfare to now propose to further compound a clearly unprotective and indefensible approach to such an obvious threat to the future of our nation. For too long NRC's Rulemaking jeopardized our nation. Clearly, there is NO REAL long-term solution. Both transport and long-term storage of the nuclear industry's high-level radioactive wastes threaten our future in so many ways. In truth and reality, recycling has proven to be a costly environmental disaster.

It is long past time for NRC to take a far more realistic and precautionary approach to dealing with the nuclear industry's high-level radioactive wastes. NRC's 1984 "decision" that said the agency was "confident" that making irradiated fuel was not a problem was not only irresponsible, it has been proven inaccurate. NRC claimed there would be an off-site repository by 2009. It is 2009 and there is no off-site repository.

There is no safe or acceptable solution to the massive amounts of deadly high-level radioactive wastes already produced at US nuclear plants. These dangerous wastes that remain a threat for over a million years already pose unacceptable and astronomical threats to future generations, including the hundreds of billions of dollars that it will cost the public to deal with them.

Clearly, in this economy with the debt forced on future generations for so many things, producing more high-level radioactive wastes and more associated costs is unacceptable. The only way to protect the public's interests is for the nuclear industry to stop producing this deadly high-level radioactive waste.

Nuclear power plants and the deadly high-level radioactive wastes they produce are too costly to taxpayers, too polluting, and too dangerous.

- We don't need nuclear power. There are truly safe, clean energy alternatives that will not produce deadly wastes that jeopardize the health, safety, and welfare of future generations. DOE acknowledges solar power alone could provide 55 times our entire nation's energy needs.

The public can no longer afford to bear the burden for the astronomical financial costs of transporting and storing the nuclear industry's high-level radioactive wastes that already exist, much less those which will continue to be produced by existing or new nuclear power plants. To protect our nation's future, it is long past time for NRC to admit the obvious and take action that will begin a process to stop high-level radioactive waste threats from nuclear power plants.

In reality, there is obviously no safe solution to the nuclear industry's high-level radioactive wastes. Both transport and storage off-site and on-site storage present unacceptable risks.

1. **TRANSPORT and STORAGE** - The transport of massive amounts of deadly high-level radioactive wastes off-site from nuclear plants is not a safe or responsible solution.
 - Transport sets up the potential for catastrophic accidents whether by train or truck. Devastating accidents in the recent past should sound an alarm to NRC that transport of high-level radioactive wastes is potentially disastrous.
 - Transport also invites terrorists.
 - Massive transport of high-level radioactive wastes poses an unacceptable risk.
2. **DEFACTO High-Level Radioactive Waste Dumps** - Allowing 104 DEFACTO high-level radioactive waste dumps at nuclear plants is also an unacceptable risk for those who live in the region of the nuclear plants, especially those in heavily populated regions such as ours, where there is little real hope of safe evacuation from an accident or terrorist attack involving these deadly high-level radioactive wastes. Above ground storage of massive amounts of deadly high-level radioactive wastes is a recipe for disaster.

Many people in our region have "NO Confidence" in NRC's claim of "Confidence". In fact, many of us are terrified. Why? NRC's irresponsible claim of "confidence" has allowed the build-up of growing piles of deadly high-level radioactive wastes which now need to be stored above ground in casks at Limerick for decades, if not forever. We have been forced to live with a DEFACTO high-level radioactive waste dump in our backyard which invites terrorists and exposes us to the consequences of accidents from human error, fires, corrosion, and other breakdown of materials in casks holding wastes.

Why are we concerned about becoming a DEFACTO high-level radioactive waste dump?

- ✓ Limerick Nuclear Power Plant should never have become a DEFACTO high-level radioactive waste dump in this very heavily populated region. It would be impossible for many to safely evacuate. Storing dangerous high-level radioactive wastes in above-ground casks invites terrorists and subjects us to deadly accidents. Both present unacceptable, unnecessary risks to all in our entire region. Off-site transport also presents unacceptable risks throughout our region.
- ✓ With good reason, there is also major concern about long-term corrosion of steel holding casks. There has never been testing of the materials used with the corrosive air at Limerick. Over 300 pounds of corrosive chemicals are added to the cooling tower waters every day. NRC has no idea how long it will take corrosive chemicals emitted with 42 million gallons of steam every day to corrode the steel holding the high-level radioactive wastes when continuously subjected to such massive corrosive steam that can enter the casks. It is illogical and unscientific for NRC to be "comfortable" affirming that waste could remain on site where it was generated for the interim period, projected to be 30 years after the expiration of the waste generation license.
- ✓ The Limerick Nuclear Power Plant site has a fault line going through it.
- ✓ There is an airport less than 1 mile away providing all kinds of opportunities for terrorists.

We think it is highly negligent to allow deadly radioactive wastes to continue to be produced and stored in the back yard of this heavily populated region for decades (if not forever), or to transport them from this region.

It has become an urgent necessity for NRC employees to take their responsibility seriously and speak out in a loud voice to protect future generations of all families across the nation, including your own.

- **We strenuously object to NRC's previous and proposed illogical, deceptive, and unsubstantiated claim of "confidence" and "reasonable assurance" related to the nuclear industry's high-level radioactive waste storage. NRC has protected the profits of the nuclear industry at the expense of the public's interests. This should not continue.**

Below - NRC's proposed language shows a detachment from reality and callous disregard:

Finding 2: The Commission finds reasonable assurance that sufficient mined geologic repository capacity can reasonably be expected to be available within 50–60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of any reactor to dispose of the Commercial high-level radioactive waste and spent fuel originating in such reactor and generated up to that time.

Finding 4: The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and either onsite or offsite independent spent fuel storage installations.

The financial burden on the public for the nuclear industry's high-level radioactive wastes is neither sustainable, nor acceptable. In this economy, how can the public afford any additional financial burdens? Why should the public be burdened with these costs in the first place?

- **NRC's proposed language will lead to unbearable and unnecessary financial burdens on the public that will increase for future generations.**
- **Full cost accounting costs to the public to fully deal with the damage and storage of the nuclear industry's high-level wastes already produced could be astronomical.**
 - ✓ Just one example of storage costs is Yucca Mountain, a catastrophe in the making, which is an environmentally unsuitable financial debacle. \$9 Billion has already been wasted. Nevada predicted the eventual cost would top \$100 Billion. The Ratepayer Nuclear Waste Fund (from the public) will pay \$30 Billion. Taxpayers will pay the other \$70 Billion just to build a site that won't even hold all the waste.
 - ✓ If Yucca Mountain is completed it won't be before 2020. So much high-level radioactive waste exists already from the 104 nuclear reactors in the US, it is estimated that Yucca Mountain would be unable to hold them all. It was projected that there would be one shipment every 1 hour and 45 minutes entering Nevada for the next 30 years with just wastes to date. This is already unmanageable.

In this economy it is negligent for NRC to make unsubstantiated statements that will lead to an increase in the already unbearable financial burden to the public.

With a new administration that values public health, safety, and welfare, we are hopeful that NRC employees will start to speak up for what is in the best interests of the public and not the profits of the nuclear industry.

Please respond in writing to our comments.

Thank You,

**Dr. Lewis Cuthbert
ACE President**

Cc: Senator Casey
Senator Specter
Senator Boxer
Congressman Gerlach
Congressman Sestak
Congressman Dent

Principles for Safeguarding Nuclear Waste at Reactors

The following principles are based on the urgent need to protect the public from the threats posed by the current vulnerable storage of commercial irradiated fuel. The United States does not have a near-term solution for the permanent storage of high-level nuclear waste. The proposed Yucca Mountain site is unsafe for geologic storage of nuclear waste and the program remains mired in bad science, mismanagement, and yet another design overhaul. Even if licensed, Yucca Mountain could not legally contain all of the waste produced by existing reactors. Under the U.S. Department of Energy's unrealistically optimistic scenario, Yucca Mountain is not predicted to begin receiving waste until at least 2017 and transporting waste to the site would take more than 30 years. Meanwhile, irradiated fuel at reactor sites remains vulnerable to accidents and attacks.

The undersigned organizations' support for improving the protection of radioactive waste stored at reactor sites is a matter of security and is in no way an indication that we support nuclear power and the generation of more nuclear waste.

- ◆ **Require a low-density, open-frame layout for fuel pools:** Fuel pools were originally designed for temporary storage of a limited number of irradiated fuel assemblies in a low density, open frame configuration. As the amount of waste generated has increased beyond the designed capacity, the pools have been reorganized so that the concentration of fuel in the pools is nearly the same as that in operating reactor cores. If water is lost from a densely packed pool as the result of an attack or an accident, cooling by ambient air would likely be insufficient to prevent a fire, resulting in the release of large quantities of radioactivity to the environment. A low-density, open-frame arrangement within fuel pools could allow enough air circulation to keep the fuel from catching fire. In order to achieve and maintain this arrangement within the pools, irradiated fuel must be transferred from the pools to dry storage within five years of being discharged from the reactor.
- ◆ **Establish hardened on-site storage (HOSS):** Irradiated fuel must be stored as safely as possible as close to the site of generation as possible. Waste moved from fuel pools must be safeguarded in hardened, on-site storage (HOSS) facilities. Transporting waste to interim away-from-reactor storage should not be done unless the reactor site is unsuitable for a HOSS facility and the move increases the safety and security of the waste. HOSS facilities must not be regarded as a permanent waste solution, and thus should not be constructed deep underground. The waste must be retrievable, and real-time radiation and heat monitoring at the HOSS facility must be implemented for early detection of radiation releases and overheating. The overall objective of HOSS should be that the amount of releases projected in even severe attacks should be low enough that the storage system would be unattractive as a terrorist target. Design criteria that would correspond to the overall objective must include:
 - Resistance to severe attacks, such as a direct hit by high-explosive or deeply penetrating weapons and munitions or a direct hit by a large aircraft loaded with fuel or a small aircraft loaded with fuel and/or explosives, without major releases.
 - Placement of individual canisters that makes detection difficult from outside the site boundary.

- ◆ **Protect fuel pools:** Irradiated fuel must be kept in pools for several years before it can be stored in a dry facility. The pools must be protected to withstand an attack by air, land, or water from a force at least equal in size and coordination to the 9/11 attacks. The security improvements must be approved by a panel of experts independent of the nuclear industry and the Nuclear Regulatory Commission.
 - ◆ **Require periodic review of HOSS facilities and fuel pools:** An annual report consisting of the review of each HOSS facility and fuel pool should be prepared with meaningful participation from public stakeholders, regulators, and utility managers at each site. The report must be made publicly available and may include recommendations for actions to be taken.
 - ◆ **Dedicate funding to local and state governments to independently monitor the sites:** Funding for monitoring the HOSS facilities at each site must be provided to affected local and state governments. The affected public must have the right to fully participate.
 - ◆ **Prohibit reprocessing:** The reprocessing of irradiated fuel has not solved the nuclear waste problem in any country, and actually exacerbates it by creating numerous additional waste streams that must be managed. In addition to being expensive and polluting, reprocessing also increases nuclear weapons proliferation threats.
-

Post-Japan nuke inspection raises questions

Lessons come from things gone wrong.

That was the essence of the NRC's Paul Krohn's comments during an annual community briefing on the post-Japan inspection of Exelon's Limerick Nuclear Generating Station.

Krohn said the biggest advances in nuclear safety have come as a result of what is learned in the wake of the biggest disasters, such as Chernobyl and Three-Mile Island.

Now, the NRC is trying to learn from the events at Japan's Fukushima Daiichi plant that occurred as the result of the March 11 earthquake and tsunami.

What they are learning as it relates to Limerick bears a closer look.

The NRC recently initiated a series of preliminary inspections at all 104 of the nation's nuclear plants, including Limerick.

The results of the inspections at Limerick indicate some systems, structures and components "could not be relied upon to fulfill their flood mitigation function following a design basis earthquake."

Examples cited by the inspectors include the potential that turbine buildings' flood and fire prevention seals might not tolerate a "seismic event."

NRC spokesman Neil Sheehan noted that any findings that raised questions were on issues that went beyond what would be considered normal. In other words, it's not realistic to expect a tidal wave in Montgomery County, Pennsylvania.

But at the same time the NRC is studying the events in Japan, geological data is being re-evaluated showing that earthquakes are more likely in Pennsylvania than was once believed.

The realization that the region has potential for an earthquake along with renewed areas of concern brought to light in inspections is certainly good reason for more analysis with a critical eye.

The greatest lesson to be learned from Japan is that worst-case scenarios can occur, and when they do, a nuclear plant can become the center of spreading disaster.

"That will never happen here" is a dangerous attitude.

Rather, Exelon and the NRC should work to insure that every scenario is addressed with adequate safety measures — especially the worst-case ones.

OUR VIEW

Spent fuel storage analyzed in wake of Japan nuclear crisis

The ongoing crisis in Japan has brought new fears and concerns about nuclear power plants into the spotlight and raised awareness of the fragile sense of security for those living near nuclear plants.

Those heightened concerns are certainly relevant in the Pottstown tri-county area, which matches the footprint of Exelon Nuclear's Limerick Generating Station's 10-mile-radius evacuation zone.

The disaster that has resulted from the earthquake and tsunami in Japan earlier this month has left the world reeling with disbelief at the extent of death and devastation. But it has also left the world questioning the safety and wisdom of generating power with a process that if gone awry can lead to horrific disasters all their own.

In the analytical fallout from the crippled Fukushima plant come questions and second-looks that could affect the future of nuclear plants here and abroad. The impact on Limerick is certainly top of mind for this region.

While the initial comparisons and analysis dwelt on the reactors themselves, focus has now shifted to the dangers of spent fuel and the continuing struggle in this country over what to do with it.

Spent fuel is a subject familiar to Limerick. In 2007, ground was broken on a spent fuel facility that takes older, colder fuel from the plant's spent fuel pool and stores it in a dry cask storage system. At the time it was built, that system was described by Exelon as temporary until the federal repository beneath Nevada's Yucca Mountain was completed.

But since then, the Yucca Mountain project has been scrapped, and scientists are now considering that the dry cask storage may be safer in the long run.

About 80 percent of the 63,000 metric tons of used fuel in the United States is currently stored in pools, including pools at Limerick. But most plants are now turning to dry cask storage for storage of rods going forward.

Made of incredibly thick steel and concrete, these casks hold the fuel that was used when the plants first opened and no longer need water to keep cool.

Although cooler, it should be noted that this fuel nevertheless remains radioactive for hundreds of years.

But the "temporary" solution to the problem of storing spent fuel may have a beneficial side effect.

Edwin Lyman, a physicist with the watchdog group the Union of Concerned Scientists, said recently that the casks may turn out to be safer than the fuel pools.

In addition to the closer analysis of spent fuel storage, the nuclear energy industry is also examining updated and more detailed analysis of seismic effects from natural causes.

Any threat, natural or manmade, is being looked at closely with an eye toward necessary precautions and safety alerts. Limerick was already due for a Nuclear Regulatory Commission review of susceptibility to earthquake damage as the result of new geologic data about the region. The Japan disaster made it even more timely and relevant.

Since the Japanese disaster, NRC has agreed to Obama's request to do a 30-day "quick look" review of all 104 U.S. plants as well as a longer 90-day review.

Also, Exelon has applied for an extension of Limerick's license. In 2009, it applied for the license for Unit 1, which entered commercial service in 1986, to be extended to 2024; and for Unit 2, put on line in 1990, to 2029. Limerick's license renewal does not seem to be in question, but the science which allows scientists and the NRC to assess the risk posed by earthquakes seems to be in flux.

The disaster in Japan raises new questions about nuclear plant safety and suggests points which should be emphasized as well as lessons to be learned. The fallout from this disaster is occurring on the other side of the world, but the long-term effects are closer to home — as close as the Limerick towers that shadow the towns of this region every day.

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What About The Spent Fuel?

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January 1, 2002 · By [Robert Alvarez](#) · Originally published in [The Bulletin of the Atomic Scientists](#)

Until recently, concerns about attacks on nuclear power plants mainly on the vulnerability of reactors. Spent fuel ponds may be difficult to safeguard.

In this 2002 article for the Bulletin of the Atomic Scientists, Robert Alvarez warned about the dangers posed by the practice of indefinitely leaving spent fuel rods in nuclear reactors. Nine years later, as workers at the Fukushima Nuclear site in Japan attempt to control the damage caused to the plant after last week's massive earthquake and tsunami, his article is more timely than ever. Click [here](#) for the full article.

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[NukeNet] Spent Fuel Pool Risks In US Dwarf Fuku Daiichi & N.A.Science Concludes SPFs Are Credible Terrorist Target

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Wed May 25 2011 1:52:23 AM

Sender : nukenet-bounces@energyjustice.net

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<http://www.nytimes.com/2011/05/25/business/energy-environment/25nuke.html?hp>

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International Network of Engineers and Scientists Against Proliferation

◀ Bulletin 22 – Nuclear Policy, Terrorism, and Missile Defense ▶

Radiological Terrorism: Sabotage of Spent Fuel Pool

Hui Zhang ■

The September 11 large-scale terrorist attacks on the World Trade Center and the Pentagon show the threat of nuclear and radiological terrorism is real. A successful attack or sabotage on a nuclear facility could cause the most potentially devastating radiological release into the atmosphere. While many people focus their concerns on the vulnerability of reactor containment buildings, an increasing number of nuclear experts are concerned about the spent fuel pools (SFP) which would be more vulnerable than the reactor containment building, because most SFPs are housed in far less robust structures than the reactor containment vessels. Moreover, a SFP would contain much more radiation than a reactor core.⁽¹⁾ In particular, one major concern is the vulnerability of the pools' cooling systems. In absence of cooling water, the spent fuel would overheat, and the fuel-cladding could melt or catch fire in some cases. Thus it could release radioactive substances to the environment.

In fact, a number of countries are taking spent nuclear fuel vulnerabilities very seriously. For example, France has installed anti-aircraft missiles around its spent fuel ponds at its reprocessing facility. However, some scholars and experts argue that these nuclear facilities could not be vulnerable to terrorist attacks.

Risk of Spent Nuclear Fuel at Reactor Pools

In this paper, I will explain the potential consequences of the sabotage of spent fuel pools and the vulnerabilities of these pools to terrorist attacks. Finally, I will suggest some security measures to protect these spent fuel facilities.

Storage of Spent Nuclear Fuel

Each year, a typical 1 GWe light water reactor (LWR) discharges about 20 to 30

metric tonnes of heavy metal (tHM) in spent nuclear fuel (SNF). The SNF is very radioactive. Typically, each tonne SNF would emit above 200 million curies of activity at the time of reactor shutdown^[2]. Thus, the SNF is very hot. For example, one day after shutdown, 30 t LWR spent fuel has a thermal output of about 6 MW.^[3] To prevent the spent fuel from melting, once discharged from the reactor, it is placed on storage racks in rectangular pools, typically 10-20 m long, 7-15 m wide, and 12-13 m deep.^[4] The pool is usually made of reinforced concrete walls four to five feet thick with stainless steel liners. Pools at pressurized water reactors (PWR, the most common reactors) are usually outside the reactor containment building and partially or fully embedded in the ground. Most of the spent fuel pools at boiling water reactors (BWR) are housed in reactor buildings and above ground. A pool can have a 15 to 30 year storage (i.e. about 400-800 t for a PWR) of SNFs discharged from a reactor. Spent fuel pools could hold about 10 times more long-lived radioactivity than a reactor core. After a period of cooling time, the spent fuel can be removed from the wet pool for a dry storage or reprocessing.

Today, about 10,000 tHM spent fuel is generated annually. Over 150,000 tHM spent fuels were in storage by 2000. More than 90% of the spent fuel in the world today is stored in pools at reactor sites or in away-from-reactor facilities.^[5] The abandoning or delaying of reprocessing and the absence of established geologic repositories through the world have resulted in an increase of spent fuel stored at the power plants or in central repositories. Moreover, most reactors were built with an originally planned reprocessing program that made these reactors have much less pool storage capacity. Thus, in many cases, these pools are approaching or have exceeded their original design capacity. To compensate, in practice, many reactor operators in the world are "re-racking" the spent fuel in the pool so that the spent fuel is stored more densely. For example, at most operating reactors in the United States, the 're-rack' of spent fuel has been done. As discussed below, these densepacked pools would be more vulnerable to a pool fire and cause a large amount of radioactive release.

The Consequence of Cesium-137 Release

A 400 t PWR pool holds about 10 times more long-lived radioactivity than a reactor core. A radioactive release from such a pool would cause catastrophic consequences. One major concern is the fission product cesium-137 (Cs-137), which made a major contribution (about three quarters) to the long-term radiological impact of the 1986 Chernobyl accident. A spent fuel pool would contain tens of million curies of Cs-137. Cs-137 has a 30 year half-life; it is relatively volatile and a potent land contaminant. In comparison, the April 1986 Chernobyl accident released about 2 Mega Curies (MCi) Cs-137 into the atmosphere from the core of the 1,000 MWe unit 4. It is estimated that over 100,000 residents were permanently evacuated because of contamination by Cs-137. The total area of the radiation-control zone is about 10,000 km², in which the contamination level is greater than 15 Ci/km² of Cs-137.^[6]

A typical 1 GWe PWR core contains about 80 t fuels. Each year about one third of the core fuel is discharged into the pool. A pool with 15 year storage capacity will

hold about 400 t spent fuel. To estimate the Cs-137 inventory in the pool, for example, we assume the Cs-137 inventory at shutdown is about 0.1 MCi/tU with a burn-up of 50,000 MWt-day/tU, thus the pool with 400 t of ten year old SNF would hold about 33 MCi Cs-137.⁽⁷⁾ Assuming a 50-100% Cs-137 release during a spent fuel fire,⁽⁸⁾ the consequence of the Cs-137 exceed those of the Chernobyl accident 8-17 times (2MCi release from Chernobyl). Based on the wedge model, the contaminated land areas can be estimated.⁽⁹⁾ For example, for a scenario of a 50% Cs-137 release from a 400 t SNF pool, about 95,000 km² (as far as 1,350 km) would be contaminated above 15 Ci/km² (as compared to 10,000 km² contaminated area above 15 Ci/km² at Chernobyl). Thus, it is necessary to take security measures to prevent such an event from happening.

Vulnerability of Spent Fuel Pools

Until today, no accident or sabotage happened to cause the release of radioactivity from a spent fuel pool. However, many scientists and nuclear security experts are very concerned about a significant release of radioactivity by a possible spent fuel fire, especially in the case of dense packing of pools – a method that has been used by many reactor operators worldwide including for most pools in the US.

The most serious risk is the loss of pool water, which could expose spent fuel to the air, thus leading to an exothermal reactions of the zirconium cladding, which would catch fire at about 9000 °C. Thus, the Cs-137 in the rods could be dispersed into the surrounding atmosphere. Based on a *Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plant* in 2000, the US Nuclear Regulatory Commission (NRC) conceded that "the possibility of a zirconium fire cannot be dismissed even many years after a final reactor shutdown."⁽¹⁰⁾ Recently, a number of nuclear scientists outside the government agency arrived at the same conclusion. For example, the new technical study *Reducing the hazards from stored spent power-reactor fuel in the United States* by R. Alvarez et al.⁽¹¹⁾ points out that "In the absence of any cooling, a freshly discharged core generating decay heat at a rate of 100 kWt/tU would heat up adiabatically within an hour to about 600 °C, where the zircaloy cladding would be expected to rupture under the internal pressure from helium and fission product gases, and then to about 900 °C where the cladding would begin to burn in air." In addition, although the cooler fuel could not ignite on its own, many scientists are concerned that fire from freshly spent fuel could spread to adjacent cooler fuel by some mechanisms, including zircaloy oxidation propagation.⁽¹²⁾ Finally, even for the case of non-dense-packed pools, there could still be some sabotage scenarios that cause a significant amount of radioactive release as discussed in the following section.

Thus, a loss of pool cooling could cause a pool fire. Then the question is how such a loss of pool water is brought about. A terrorist group could cause a loss of cooling water in a number of ways, such as, causing the loss of cooling, thus boiling the water off through the failure of pumps or valves, through the destruction of heat exchangers, or through a loss of power for the cooling system. It is estimated that, in the case of a loss of cooling, the time it would take for a spent fuel pool to boil down to near the top of the spent fuel would

be as short as several hours, depending on the cooling time of the discharge fuel.⁽¹³⁾ Moreover, in the case of terrorist attack, the operators of nuclear facilities might not have enough time to provide emergency cooling.

causing the drainage of coolant inventory by piping failures or siphoning, and by gate and seal failures. Furthermore, a heavy load including a fuel transport cask could be dropped in the pools thus causing a collapse of the pool floor and a water leak. As reported, "The analysis exclusively considered drops severe enough to catastrophically damage the SFP so that pool inventory would be lost rapidly and it would be impossible to refill the pool using onsite or offsite resources. There is no possibility of mitigating the damage, only preventing it." "The staff assumes a catastrophic heavy load drop (creating a large leakage path in the pool) would lead directly to a zirconium fire."⁽¹⁴⁾

puncturing the pool and causing a drainage by suicide airplanes, missiles, or other explosives. For the case that spent fuel pools are located above ground level, a suicide airplane could breach the pool bottom or sidewalls and cause a complete or partial drainage. A US NRC study estimated that a large aircraft (one weighing more than 5.4 tonnes) would have a 45% probability of penetrating the five-foot thick concrete wall of a spent fuel pool. The NRC staff has decided that it is prudent to assume that a turbine shaft of a large aircraft engine could penetrate and drain a spent fuel storage pool.⁽¹⁵⁾

However, there are some opposing arguments regarding the impact of an aircraft on a spent fuel pool. For example, a study conducted by the Electric Power Research Institute at the request of the Nuclear Energy Institute, which considers the impact of a Boeing 767 on spent fuel storage pools concluded that "the stainless steel pool liner ensures that, although the evaluations of the representative used fuel pools determined that there was localized crushing and cracking of the concrete wall, there was no loss of pool cooling water. Because the used fuel pools were not breached, the used fuel is protected and there would be no release of radionuclides to the environment."⁽¹⁶⁾ However, many experts are concerned about the spent fuel pool damage from an aircraft crash.

A terrorist could also use anti-tank missiles to puncture a pool. Modern anti-tank weapons can be fired by shoulder or from a vehicle or boat, and launched as far as 2 km away. It is reported that some modern anti-tank missiles would be able to penetrate up to 3 m of reinforced concrete. Thus these weapons could be used to conduct an off-site attack on the pools. Moreover, a terrorist attack could include some kinds of on-site explosions to damage the pools, such as if a large truck bomb were detonated near the pool; or if a terrorist carried a certain type of explosive to the pool and blew a sizeable hole in the pool. In particular, the truck bomb would pose a big threat.

Risk of Spent Fuel Pools at Reprocessing Plants

Another risk is from the spent fuel pools at reprocessing plants. A reprocessing plant has even greater pool storage capacity than that of a reactor pool. Before reprocessing, the received spent fuels are stored in wet pools at the reprocessing

plants. The buildings that house the pools could be even weaker than those pools at reactor sites. In particular, the roof of the building could be more vulnerable. Most of the sabotage scenarios conceivable for reactor pools could be applied to these pools at reprocessing plants. However, unlike those freshly discharged spent fuels at reactor pools with dense packing, the cooler spent fuel at reprocessing pools, which is at least two years old, could be difficult to ignite automatically in the absence of cooling.

Nevertheless, there might still be some ways to cause a significant radioactive release by a successful terrorist attack. For example, a two- or multiple-stage attack by truck bombs, aircraft impacts or other kinds of on-site explosion could at least breach the zircaloy cladding or even partly melt the fuel cladding. Even though this would not ignite a spent fuel fire, a significant fraction of Cs-137 in the rods could be released into the atmosphere. For example, a pool with 2,000 t ten-year-old SNF would hold about 170 MCi Cs-137. If 3% of this Cs-137 inventory were released,^[17] about 5 MCi Cs-137 would be released, which is two times more than the 1986 Chernobyl accident. Furthermore, terrorists could pour fuel in the pool and start a fire that would cause ignition of the zircaloy cladding and lead to a greater release of the Cs-137 inventory. Recent results from France indicate that heating at 1,500 °C of high-burnup spent fuel for one hour caused the release of 26% of the Cs inventory.^[18] Thus it would release about 44 MCi of Cs-137 into the environment, which would be twenty times more than the 1986 Chernobyl accident.

The major operating reprocessing plants are at French La Hague, British Sellafield, and Russian Mayak, and Japan is currently building a major reprocessing facility (with a capacity of 800 tHM/y) at Rokkasho, which is about 90% complete. UK's British Nuclear Fuels Plc. (BNFL) operates two reprocessing plants at Sellafield, the Magnox B205 and the Thermal Oxide Reprocessing Plant (THORP). The B205 plant has a capacity of 1,500 tHM/y and reprocesses SNF from 16 British Magnox reactors. THORP has a capacity of 1,200 tHM/y and reprocesses SNF from 14 British Advanced Gas-Cooled Reactors (AGR) as well as imported SNF. Like the Magnox reprocessing plant, THORP uses the standard Purex method. As reported, the French La Hague nuclear reprocessing facilities (with a normal capacity of 800 tHM/year in each of the two facilities) holds a stock of radioactive substances that greatly exceeds those of all the French nuclear reactors put together. According to a Cogema presentation on the situation of its storage pools on 30 June 2001, 7,484.2 t varied nuclear fuel (of which 7,077.7 t from France), is spread in five pools (which provide a total storage capacity of 13,990 t.) In addition, over 55 t separated plutonium, over 1,400 m³ highly radioactive glass, and 10,000 m³ of radioactive sludges are located there.^[19]

Some experts are already concerned about the possible consequence of a terrorist attack on the La Hague nuclear reprocessing facilities. As a COGEMA-La Hague spokesman declared after September 11, as far as the design basis is concerned, the facilities are no more protected against an airliner crash than any other nuclear power station.^[20] The World Information Service on Energy, Wise-Paris, estimated the potential impact of a major accident in La Hague's pools.^[21] The calculation was made for the case of an explosion and/or fire in the spent fuel storage pool D (the

smallest one), assuming that it is filled up to half of its normal capacity of 3,490 t, supposing a release of up to 100% of Cs-137. Based solely on the stock of Cs-137 in pool D, it is shown that a major accident in this pool could have an impact up to 67 times that of the Chernobyl accident. Moreover, the total Cs-137 inventory in the pools of La Hague reprocessing facilities is about 7,500 kg, 280 times as much as the Cs-137 amount released from the 1986 Chernobyl accident.

In fact, since 11 September 2001, attention has been drawn to the physical protection of nuclear power plants and reprocessing facilities. For example, France has installed anti-aircraft missiles around its spent fuel pond at the La Hague reprocessing facilities. Also in the UK, the House of Commons defense committee stressed that attention should be focused on the vulnerability of nuclear installations, including reprocessing plants. The Royal Air Force Tornado F3 fighters based at Coningsby, Lincolnshire, are responsible for intercepting hijacked commercial aircraft deemed a threat to UK nuclear sites. In July 2002, the British government published a White Paper entitled *Managing the Nuclear Legacy: A Strategy for Action* which proposed to transform the United Kingdom Atomic Energy Authority (UKAEA) Constabulary into a stand-alone force, the Civil Nuclear Constabulary (CNC).^[22]

Reducing the Risks Posed by Spent Fuel Pools

Spent fuel facilities could become a tempting target for terrorists. Indeed, on September 11, the terrorists just used simple box-cutters to convert a fuel-laden jetliner into guided missiles and cause mass destruction. Similarly, terrorists could use conventional means to turn an adversary's nuclear spent fuel facilities into radiological weapons. Therefore it is an urgent priority to enhance the current nuclear security system worldwide. Here it is suggested that several security measures should be taken to improve the existing security systems for nuclear installations including spent fuel facilities.

Every country with SNF facilities should review and upgrade its basis used for designing physical protection for these facilities to ensure that it reflects the threat as perceived after September 11. It should take some effective measures including a strong two-person rule protecting against well-trained insiders. It also needs to deny access to these nuclear facilities either by land or air to protect against sabotage. This would include, for example, re-examining the size of exclusion zones and adding effective physical barriers and delay mechanisms around nuclear facilities to prevent against truck bombs or boat attacks, and setting up a no-fly-zone around nuclear facilities to exclude attacks of suicide aircrafts. Moreover, all these facilities should be protected by well-trained, armed guard forces.

Each country should enhance its security system to reduce the risk posed by spent fuel pools. To protect against terrorist sabotage on these pools, some specific measures should be taken, which would include hardening the pool floor and walls to prevent the breach by weapon attacks or heavy load drop, thus reducing the risk of the leak of coolant, and providing for emergency ventilation of spent fuel buildings or installing emergency water sprinkler systems to reduce the likelihood of

fire in case of a loss of coolant. Furthermore, to reduce the likelihood of a pool fire, as much spent fuel as possible, especially SNF at pools with dense packing, should be moved into the less vulnerable dry storage type of cask as soon as possible. Unlike wet pools, dry casks are cooled by natural convection that is driven by the decay heat of the spent fuel itself, thus they are not vulnerable to loss of coolant. In the U.S., for example, only about 4% of the spent fuel inventory is in dry storage, because there is no financial incentive for the owner to move wastes to safer dry storage. It is estimated that the cost of onsite dry-cask storage for an additional 35,000 t of older spent fuel is about 0.03-0.06 cents per KWh generated from that fuel.^[23] Nevertheless, such a cost is justified to reduce the potential catastrophic consequences of a pool fire.

The International Atomic Energy Agency (IAEA) should re-examine and update its guidelines for the physical protection of nuclear facilities. Today there is no multilateral treaty that requires nuclear facilities, including reactors and spent fuel facilities, to be protected from sabotage. The only related treaty is the 1980 *Convention on the Physical Protection of Nuclear Material*. However, it only applies to the protection from theft of material in international transportation. In 1999, the IAEA made a substantial revision of its recommendations on physical protection (INFCIRC 225/Rev.4). After the September 11 attacks, the IAEA General Conference accepted twelve physical protection principles developed by an experts' group, which include commending the IAEA's programs of training, guidance, and technical assistance to assist states in establishing or improving systems of physical protection; requesting the IAEA to strengthen its work to prevent acts of terrorism; and urging IAEA members to support all of these programs.^[24] However, all these recommendations are not mandatory. Given the threat of sabotage of nuclear facilities, the IAEA should review its guidelines for physical protections of nuclear facilities and create new requirements for regulations and standards of physical protection with their new understanding of the threat in the aftermath of September 11. At a minimum, each related country should immediately apply these standards of physical protections as recommended in INFCIRC 225/Rev.4 and by the experts' principles. Furthermore, the IAEA should soon conduct an amendment to the convention on physical protection with adoption of stronger physical protection standards against these threats and require each country to accept and apply those standards to its nuclear facilities. Also, the IAEA should be able to provide guidance, training, advisory services, and technical assistance to help countries improve their protection practices and to implement the new principles and recommendations. Finally, the international community should further enhance the international cooperative effort to improve current security systems of these nuclear facilities, including spent fuel facilities.

1. **Robert Alvarez**, *What about the spent fuel?*, Bulletin of the Atomic Scientist, vol.58, no.1, January/February 2002, pp. 45-47.
2. **1 Curie [Ci]** corresponds to an activity of $3.7 \cdot 10^{10}$ decays per second. The total radioactivity of spent fuel is calculated with ORIGEN2.1. E.g. the radioactivity of 1 MT spent fuel (50 MWd/kgU burnup) discharged from a pressurized water reactor/PWR (4.5% initial enrichment) are approximately 214 MCi at discharge, 25 MCi after one week, 13 MCi after one month, and 3 MCi after one year, respectively.
3. E.g., based on ORIGEN2.1 code, the thermal powers of 1 MT spent fuel (50 MWd/kgU burnup) discharged from a PWR (4.5% initial enrichment) are approximately 2 MW at discharge, 200 kW after one day, 100 kW after one week, and 13 kW after one year, respectively.
4. **Bennett Ramberg**, *Nuclear Power Plants as Weapons for the Enemy*, Berkeley, CA, University of California Press, 1984.
5. **Matthew Bunn et al.**, *Interim Storage of Spent Nuclear Fuel – A Safe, Flexible, and Cost-Effective Near-Term Approach to Spent Fuel Management*; A Joint Report from the Harvard University Project on Managing the Atom and the University of Tokyo Project on Sociotechnics of Nuclear Energy, June 2001.
6. *Exposures and effects of the Chernobyl accident*, Annex J in *Sources and Effects of Ionizing Radiation*, the UNSCEAR 2000 Report, vol. II (UN 2000); www.unscear.org/pdf/annexj.pdf.
7. E.g. based on ORIGEN2.1 calculation, the radioactivity of Cs-137 in 1 MT spent fuel (50 MWd/kgU burnup) discharged from a PWR (4.5% initial enrichment) are approximately $1.04 \cdot 10^5$ Ci at discharge and $8.25 \cdot 10^4$ Ci after ten years discharge, respectively.
8. Based on a spent fuel pool study by the Brookhaven National Laboratory, as much as 100% of the fuel's Cs-137 inventory would be released into the environment in a case of a pool fire. See details about the range estimate, e.g. R.J. Travis, R.E. Davis, E.J. Grove, and M.A. Azarm, *A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants*, Brookhaven National Laboratory, NUREG/CR-6451; BNL-NUREG-52498, 1997.
9. For the wedge model: the contamination level $\sigma = [Q/(\theta r Rd)] \exp(-r/Rd)$ Ci/m² where Q is the size of the release in Curies; θ is the angular width of a down-wind wedge within which the air concentration is assumed to be uniform across the wedge and vertically through the mixing layer, r is the downwind distance in meters; and Rd is the 'deposition length' $Rd = Hvw/vd$, where H is the thickness of the mixing layer, vw is the wind velocity averaged over the mixing layer, and vd, the aerosol deposition velocity, measures the ratio between the air concentration and ground deposition density. Here the released Cs-137 in a plume is assumed to be distributed vertically uniformly through the atmosphere's lower 'mixing layer' and dispersed downwind in a wedge model approximation under median conditions, that is, mixing layer thickness of 1 km, wedge-angle opening angle of 6 degrees, wind speed of 5 m/sec, and deposition velocity of 1 cm/sec. See details about the model in: *Report to the American Physical Society by the study group on*



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10. [X] US Nuclear Regulatory Commission, *Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants* (NRC, NUREG-1738, 2001).
 11. [X] Robert Alvarez, Jan Beyea, Klaus Janberg, Jungmin Kang, Ed Lyman, Allison Macfarlane, Gordon Thompson, and Frank von Hippel, *Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States*, Science & Global Security, vol.11, no.1, 2003.
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 13. [X] As an example, if a core had been loaded into the spent fuel pool five days after shutdown, it could take about eight hours to boil down. For details see: US Nuclear Regulatory Commission, *Briefing On Spent Fuel Pool Study*, Public Meeting, November 14, 1996; www.nrc.gov/reading-rm/doc-collections/commission/tr/1996/19961114a.html, p. 27.
 14. [X] NRC, *Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants*, op.cit.
 15. [X] NRC, *Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants*, op.cit., p. 3-23.
 16. [X] ABS Consulting and Anatech, *Deterring Terrorism: Aircraft Crash Impact Analyses Demonstrate Nuclear Power Plant's Structural Strength*, December 2002; www.nei.org/documents/eprinuclearplantstructuralstudy200212.pdf.
 17. [X] For the case of spent fuel transportation cask, it is estimated that 3% of the Cs-137 inventory could be released from the breached spent fuel. For details see: Edwin Lyman, *A Critique of Physical Protection Standards for Transport of Irradiated Material*, in: *Proceedings of the 40th Annual Meeting of the Institute of Nuclear Materials Management*, Phoenix, AZ, July 1999, Northbrook, IL: INMM, 1999. Here I took the same fraction of released Cs-137 in the case of spent pool.
 18. [X] NRC, Advisory Committee on Reactor Safeguards, Public meeting, April 9, 1999.
 19. [X] World Information Service on Energy (WiseParis), *La Hague Particularly Exposed to Plane Crash Risk*, Briefing NRA-v4, 26 September 2001; www.wise-paris.org/english/ourbriefings_pdf/010926BriefNRA1v4.pdf.
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 22. [X] For more details see www.dti.gov.uk/nuclearcleanup and www.dti.gov.uk/energy/nuclear/announce_pubs/conspubs/nuclear_legacy/index.shtml.
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May 24, 2011

Risk From Spent Nuclear Reactor Fuel Is Greater in U.S. Than in Japan, Study Says

By MATTHEW L. WALD

WASHINGTON — The threat of a catastrophic release of radioactive materials from a spent fuel pool at Japan's Fukushima Daiichi plant is dwarfed by the risk posed by such pools in the United States, which are typically filled with far more radioactive material, according to a study released on Tuesday by a nonprofit institute.

The report, from the Institute for Policy Studies, recommends that the United States transfer most of the nation's spent nuclear fuel from pools filled with cooling water to dry sealed steel casks to limit the risk of an accident resulting from an earthquake, terrorism or other event.

"The largest concentrations of radioactivity on the planet will remain in storage at U.S. reactor sites for the indefinite future," the report's author, Robert Alvarez, a senior scholar at the institute, wrote. "In protecting America from nuclear catastrophe, safely securing the spent fuel by eliminating highly radioactive, crowded pools should be a public safety priority of the highest degree."

At one plant that is a near twin of the Fukushima units, Vermont Yankee on the border of Massachusetts and Vermont, the spent fuel in a pool at the solitary reactor exceeds the inventory in all four of the damaged Fukushima reactors combined, the report notes.

After a March 11 earthquake and tsunami hit the Japanese plant, United States officials urged Americans to stay at least 50 miles away, citing the possibility of a major release of radioactive materials from the pool at Unit 4. The warning has reinvigorated debate about the safety of the far more crowded fuel pools at American nuclear plants.

Adding to concern, President Obama canceled a plan for a repository at Yucca Mountain in the Nevada desert last year, making it likely that the spent fuel will accumulate at the nation's reactors for years to come.

The Nuclear Regulatory Commission maintains that both pool and cask storage are safe, although it plans to re-examine the pool issue in light of events at Fukushima.

Nearly all American reactors, especially the older ones, have far more spent fuel on hand than was anticipated when they were designed, Mr. Alvarez, a former senior adviser at the Department of Energy, wrote.

In general, the plants with the largest inventories are the older ones with multiple reactors. By Mr. Alvarez's calculation, the largest amount of spent fuel is at the Millstone Point plant in Waterford, Conn., where two reactors are still operating and one is retired. The second-biggest is at the Palo Verde complex in Wintersburg, Ariz., the largest nuclear power plant in the United States, with three reactors.

Companies that run reactors are generally reluctant to say how much spent fuel they have on hand, citing security concerns. But Mr. Alvarez, drawing from the environmental impact statement for the proposed repository at Yucca Mountain, estimated the amount of radioactive material at all of the nation's reactors.

In the 1960s, when most of the 104 reactors operating today were conceived, reactor manufacturers assumed that the fuel would be trucked away to factories for reprocessing to recover uranium. But reprocessing proved a commercial flop and was banned in the United States in the 1970s out of concerns that the plutonium could find its way into weapons worldwide.

Today roughly 75 percent of the nation's spent nuclear fuel is stored in pools, the report said, citing data from the Nuclear Energy Institute. About 25 percent is stored in dry casks, or sealed steel containers within a concrete enclosure. The fuel is cooled by the natural flow of air around the steel container.

But spent fuel is transferred to dry casks only when reactor pools are nearly completely full. The report recommends instead that all spent nuclear fuel older than five years be stored in the casks. It estimated that the effort would take 10 years and cost \$3.5 billion to \$7 billion.

"With a price tag of as much as \$7 billion, the cost of fixing America's nuclear vulnerabilities may sound high, specially given the heated budget debate occurring in Washington," Mr. Alvarez wrote. "But the price of doing too little is incalculable."

The casks are not viewed as a replacement for a permanent disposal site, but as an interim solution that would last for decades.

The security of spent fuel pools also drew new attention after the attacks of Sept. 11, 2001, partly because one of the planes hijacked by terrorists flew down the Hudson River, over the Indian Point nuclear complex in Westchester County, before crashing into the World Trade Center in Manhattan.

Indian Point has pressurized water reactors with containment domes, but its spent fuel pools are outside the domes. The pools themselves are designed to withstand earthquakes and other challenges, but the surrounding buildings are not nearly as strong as those that house the reactors.

In a 2005 study ordered by Congress, the National Academy of Sciences also concluded that the pools were a credible target for terrorist attack and that consideration should be given to moving some fuel to dry casks.

25 MAY 2011: **U.S. SPENT NUCLEAR FUEL POOLS
POSE CATASTROPHIC RISKS, REPORT CLAIMS**

The huge amounts of spent nuclear fuel accumulating in containment pools across the U.S. pose a potentially catastrophic risk and should be moved to dry storage as soon as possible, a new report by the Institute for Policy Studies warns.

Of the 65,000 metric tons of highly radioactive spent fuel generated by U.S. reactors, about 75 percent is kept in cooling pools.

According to Robert Alvarez, a senior policy advisor in the U.S. Department of Energy in the Clinton administration and co-author of the report, those pools were not designed for the amount of fuel — or the level of radiation — they are holding and are vulnerable to the type of events that crippled the Fukushima plant in Japan in April.

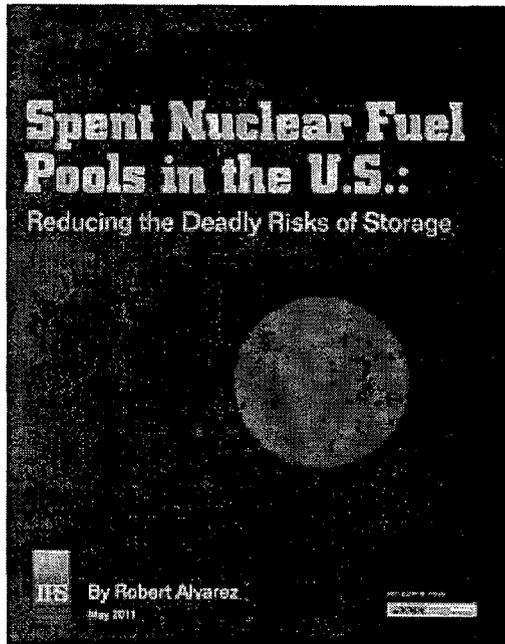
While spent fuel pools contain some of the largest concentrations of radioactivity on the planet, Alvarez said, “some are made from materials commonly used to house big-box stores and car dealerships.”

The report says the U.S. can reduce the risk by moving the rods to dry, hardened storage casks. Transporting that much spent fuel would likely take a decade and cost \$3.5 to \$7 billion, Alvarez wrote, but “the price of doing too little is incalculable.”

Spent Nuclear Fuel Pools in the U.S.: Reducing the Deadly Risks of Storage

By Robert Alvarez

The price of fixing America's nuclear vulnerabilities may be high, but the price of doing too little is incalculable.



U.S. reactors have generated about 65,000 metric tons of spent fuel, of which 75 percent is stored in pools, according to Nuclear Energy Institute data. Spent fuel rods give off about 1 million rems (10,00Sv) of radiation per hour at a distance of one foot — enough radiation to kill people in a matter of seconds. There are more than 30 million such rods in U.S. spent fuel pools. No other nation has generated this much radioactivity from either nuclear power or nuclear weapons production.

Nearly 40 percent of the radioactivity in U.S. spent fuel is cesium-137 (4.5 billion curies) — roughly 20 times more than released from all atmospheric nuclear weapons tests. U.S. spent pools hold about 15-30 times more cesium-137 than the Chernobyl accident released. For instance, the pool at the Vermont Yankee reactor, a BWR Mark I, currently holds nearly three times the amount of spent fuel stored at Dai-ichi's crippled Unit 4 reactor. The Vermont Yankee reactor also holds about seven percent more radioactivity than the combined total in the pools at the four troubled reactors at the Fukushima site.

Even though they contain some of the largest concentrations of radioactivity on the planet, U.S. spent nuclear fuel pools are mostly contained in ordinary industrial structures designed to merely protect them against the elements. Some are made from materials commonly used to house big-box stores and car dealerships.

The United States has 31 boiling water reactors (BWR) with pools elevated several stories above ground, similar to those at the Fukushima Dai-Ichi station. As in Japan, all spent fuel pools at nuclear power plants do not have steel-lined, concrete barriers that cover reactor vessels to prevent the escape of radioactivity. They are not required to have back-up generators to keep used fuel rods cool, if offsite power is lost. The 69 Pressurized Water (PWR) reactors operating in the U.S. do not have elevated pools, and also lack proper containment and several have large cavities beneath them which could exacerbate leakage.

For nearly 30 years, Nuclear Regulatory Commission (NRC) waste-storage requirements have remained contingent on the opening of a permanent waste repository that has yet to materialize. Now that the Obama administration has cancelled plans to build a permanent, deep disposal site at Yucca Mountain in Nevada, spent fuel at the nation's 104 nuclear reactors will continue to accumulate and are likely remain onsite for decades to come.

According to Energy Department data:

- The spent fuel stored at 28 reactor sites have between 200-450 million curies of long-lived radioactivity;
- 19 reactor sites have generated between 100-200 million curies in spent fuel; and,
- 24 reactor sites have generated about 10-100 million curies.

Over the past 30 years, there have been at least 66 incidents at U.S. reactors in which there was a significant loss of spent fuel water. Ten have occurred since the September 11 terrorist attacks, after which the government pledged that it would reinforce nuclear safety measures. Over several decades, significant corrosion has occurred of the barriers that prevent a nuclear chain reaction in a spent fuel pool — some to the point where they can no longer be credited with preventing a nuclear chain reaction. For example, in June 2010, the NRC fined Florida Power and Light \$70,000 for failing to report that it had been exceeding its spent fuel pool criticality safety margin for five years at the Turkey Point reactor near Miami. Because of NRC's dependency on the industry self-reporting problems, it failed to find out that there was extensive deterioration of neutron absorbers in the Turkey Point pools and lengthy delays in having them replaced.

There are other strains being placed on crowded spent fuel pools. Systems required to keep pools cool and clean are being overtaxed, as reactor operators generate hotter, more radioactive, and more reactive spent rods. Reactor operators have increased the level of uranium-235, a key fissionable material in nuclear fuel to allow for longer

operating periods. This, in turn, can cause the cladding, the protective envelope around a spent fuel rod, to thin and become brittle. It also builds higher pressure from hydrogen and other radioactive gases within the cladding, all of which adds to the risk of failure. The cladding is less than one millimeter thick (thinner than a credit card) and is one of the most important barriers preventing the escape of radioactive materials.

The April 26, 1986 nuclear catastrophe at Chernobyl in Ukraine illustrated the damage cesium-137 can wreak. Nearly 200,000 residents from 187 settlements were permanently evacuated because of contamination by cesium-137. The total area of this radiation-control zone is huge. At more than 6,000 square miles, it is equal to about two-thirds the area of the State of New Jersey. During the following decade, the population of this area declined by almost half because of migration to areas of lower contamination.

I co-authored a report in 2003 that explained how a spent fuel pool fire in the United States could render an area uninhabitable that would be as much as 60 times larger than that created by the Chernobyl accident. If this were to happen at one of the Indian Point nuclear reactors located 25 miles from New York City, it could result in as many as 5,600 cancer deaths and \$461 billion in damages.

The U.S. government should promptly take steps to reduce these risks by placing all spent nuclear fuel older than five years in dry, hardened storage casks — something Germany did 25 years ago. It would take about 10 years at a cost between \$3.5 and \$7 billion to accomplish. If the cost were transferred to energy consumers, the expenditure would result in a marginal increase of less than 0.4 cents per kilowatt hour for consumers of nuclear-generated electricity.

Another payment option is available for securing spent nuclear fuel. Money could be allocated from \$18.1 billion in unexpended funds already collected from consumers of nuclear-generated electricity under the Nuclear Waste Policy Act to establish a disposal site for high-level radioactive wastes.

After more than 50 years, the quest for permanent nuclear waste disposal remains illusory.

One thing, however, is clear, whether we like it or not: the largest concentrations of radioactivity on the planet will remain in storage at U.S. reactor sites for the indefinite future. In protecting America from nuclear catastrophe, safely securing the spent fuel by eliminating highly radioactive, crowded pools should be a public safety priority of the highest degree.

With a price tag of as much as \$7 billion, the cost of fixing America's nuclear vulnerabilities may sound high, especially given the heated budget debate occurring in Washington. But the price of doing too little is incalculable.

...

Whistle Blower Called LIMERICK CASK TECHNOLOGY "OLD AND DOWNRIGHT DANGEROUS"

Casks May Be A Sitting Duck In Face of a Crashing Aircraft

1. Cask Design Flaws

- Cement Blocks, Assembled Together, Are Not The Safest Housing For Enclosing Deadly Nuclear Fuel, Not Even Anchored to the Concrete Floor
- Industry Workers Claim NUHOMS Concrete Enclosure Falls Apart and Container Is Breached Under a Boeing Airplane Strike.

2. Corrosion of Steel

- Can Eventually Cause Nuclear Wastes to Collapse On Their Own.
- Safe Storage Depends on Airflow. Air Around Limerick Is Likely Highly Corrosive. It's Only a Matter of Time Before Invisible and Inaccessible Steel Tubes Turn to Rust.
- 40 Ton Radioactive Waste Containers, "Filled With The Nastiest Of Manmade Stuff", Are Placed And Rest Unfastened On A Set Of Steel Columns.

3. Wastes May Not Be Able To Be Retrieved

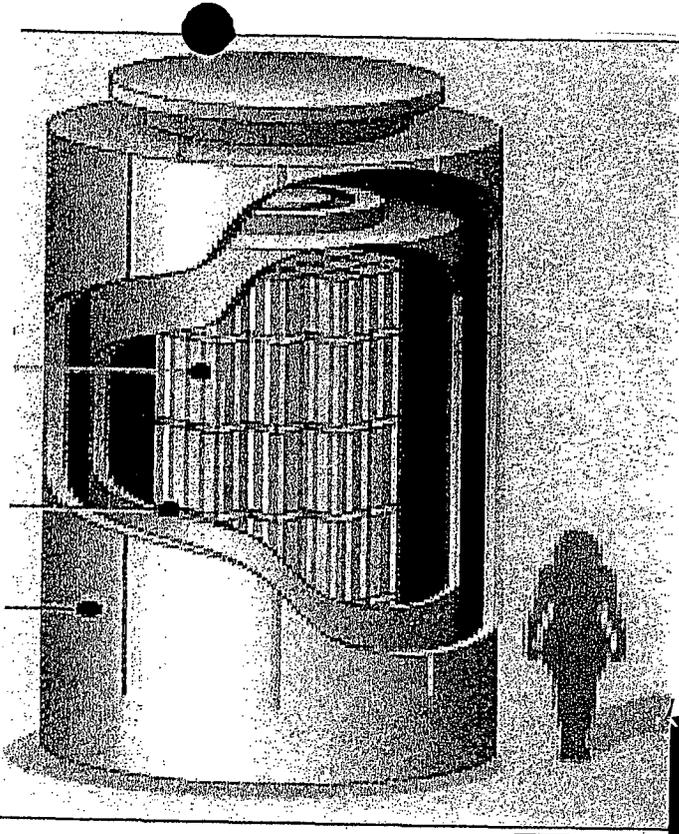
CASK PROBLEMS

Storing Limerick Nuclear Plant's High-Level Radioactive Wastes

- 1. Expected to Safety Store Wastes Only 50 Years,**
 - While Wastes Are Expected to be Dangerous Over 1 Million Years
- 2. Transferring Wastes In And Out of Casks Is Extremely Risky**
 - There Is NO Proof Wastes Could Be Removed In An Emergency or After Years of Storage
- 3. Easy Targets for Terrorists**
 - Army Testing Proves Containers Can Be Penetrated With Missiles
- 4. Vulnerable to Natural Disasters Like Earthquakes**
 - Air Vents Must Be Kept Open To Avoid Over-Heating
- 5. Undetected Corrosion and Faulty Concrete Concerns - Nuclear Engineer**
 - Transnuclear (Making Limerick's Casks), Was Cited for Violation On Thickness of Steel
 - Air Flow Is Needed Inside Casks - Air Is Likely Highly Corrosive Around Limerick
- 6. Lax and Negligent NRC Oversight**
 - NRC Knew About Corrosion on Steel Holding Wastes Since 2005
Instead of Stopping Production, NRC Stopped DOE Research

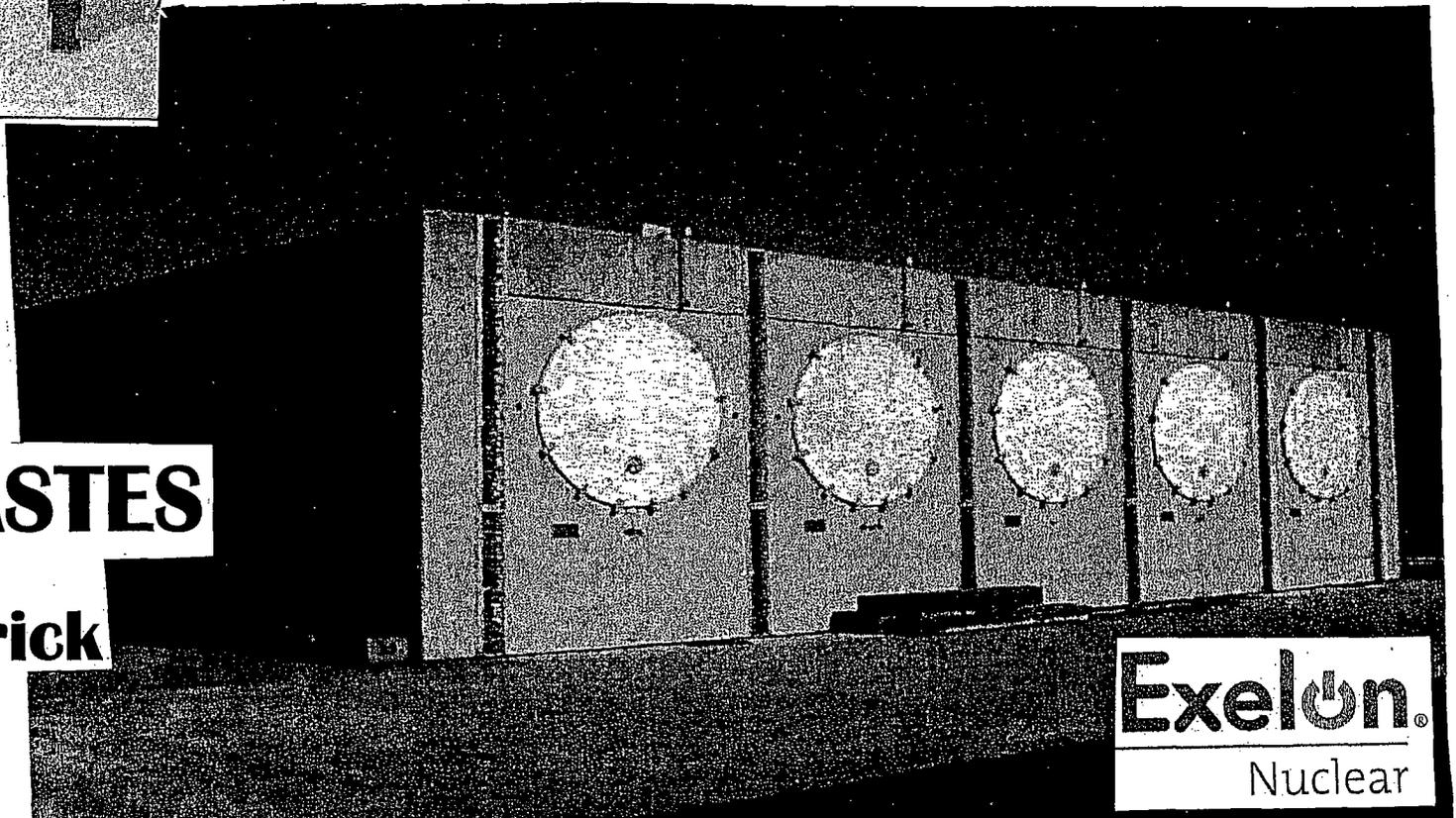
Easy Terrorist Targets

**Limerick Nuclear Plant's
High-Level Radioactive Wastes
Stored Above Ground In Casks**



**INCREASING
DEADLY WASTES**

Stored In Limerick



Exelon
Nuclear

PLEASE TAKE OUR CONCERNS SERIOUSLY THIS TIME ABOUT LIMERICK'S "SPENT FUEL" CASKS

The attached evidence is another reason Limerick must be closed, NOT RELICENSED.

Limerick must stop making deadly waste for which there is NO SAFE SOLUTION.

While there is valid cause for concern in getting Limerick Nuclear Plant fuel rods out of the packed and vulnerable fuel pools, the following body of evidence shows why we are just as worried about placing Limerick's long-lived and deadly radioactive wastes above ground in casks at the Limerick site.

- Attached evidence shows the extreme efforts ACE and others in our community went to unsuccessfully, to try to get NRC to do something about:
 1. Design flaws in Limerick's casks,
 2. Highly corrosive air at Limerick, that may over time, make it impossible to safely remove spent fuel bundles from casks if fire breaks out, or when the containers that are only expected to last 50 years need to be changed. Casks haven't been used long enough to know whether bundles can be safely removed over time, and the steel used to hold Limerick's fuel bundles was never tested for long-term exposure to all the corrosives in Limerick's air.

Now there are new worries after learning about Limerick's extreme risk from earthquakes.

- The August, 2011 earthquake in Virginia, 12 miles from a nuclear plant, shifted casks. Long-term threats from that are unknown, but we now know above ground casks are at risk.
 - Limerick is at extreme risk from an earthquake. There is a fault just 9 miles away, and another just 17 miles away.
- 1. For Limerick's updated EIS, we ask NRC to review the attached evidence and evaluate risks and long-term threats from Limerick's casks, taking all the attached evidence into account.**
 - 2. We ask NRC to look at the attached information in context with the new and increasing earthquake threats related to above ground high-level radioactive waste storage at Limerick.**

Nuke plant ranked 3rd on MSNBC quake-risk list

(LIMERICK from A1)

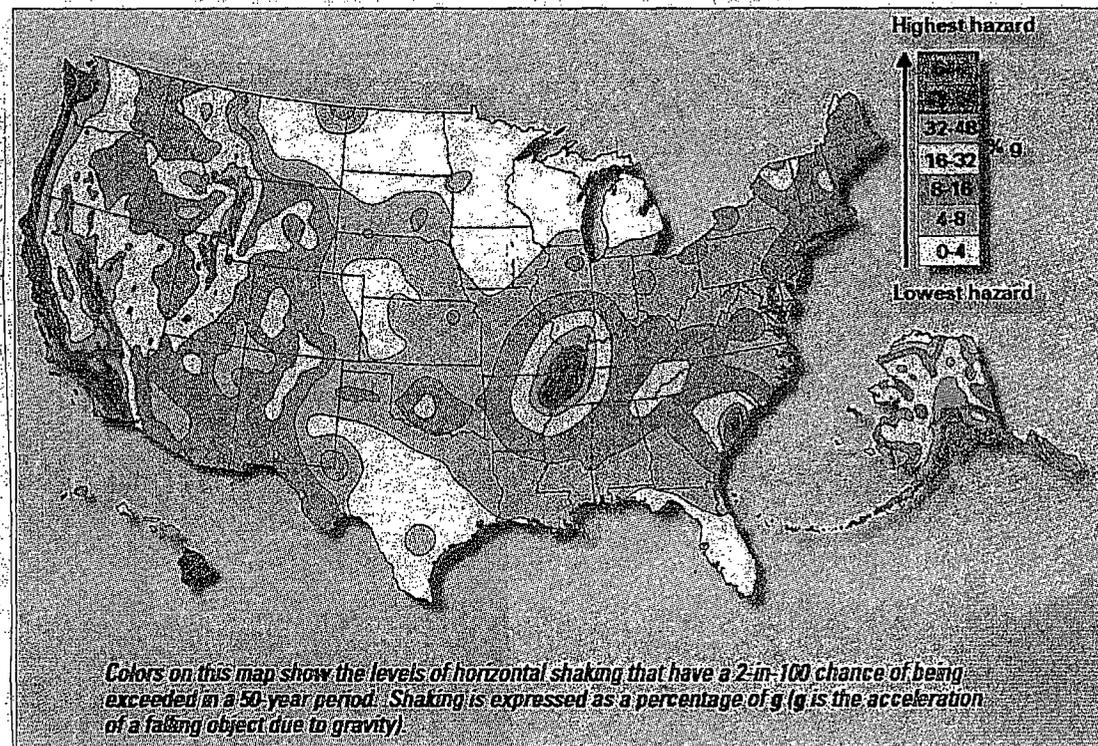
The other two are the Shippingport Atomic Power Station in Beaver County and the Three Mile Island plant in Dauphin County.

As a next step, the NRC has now selected several plants from which it will seek additional data in order to get a better estimate of the possibility of catastrophic failure from an earthquake.

NRC spokesman Neil Sheehan confirmed on March 12 that the NRC has selected Limerick as one of the plants requiring further study.

Joe Szafran, a spokesman for the Limerick facility, said Exelon is aware of the analysis and is cooperating with NRC's latest inquiry.

He also noted that Exelon is confident in the Limerick plant's ability to withstand whatever earthquakes might strike a region not known for them.



"These plants are designed with historic data and seismic information and designed to withstand the largest considered likely and then an extra margin of safety is added" in the design and construction, Szafran said.

An NRC fact sheet notes that plants are designed to withstand "the area's maximum credible earthquake" and also requires plants "to assess their potential vulnerability to earthquake events, including those that might exceed the design basis."

"We're confident the plant can withstand any earthquake that might happen here," Szafran said.

One East Coast nuclear plant better known for its proximity to a seismic fault is the Indian Point Nuclear Plant 14 miles north of New York City.

Indian Point sits in the number one spot of the MSNBC rankings for the U.S. plant at the highest risk for earthquake damage.

Built along the Hudson River, it began operations in 1963 and was subsequently found to sit near the northern terminus of the "Ramapo Fault line system," a system of faults forming the boundary between two geological formations in the mid-Atlantic which runs from New York through New Jersey and into Pennsylvania.

The southern terminus for this 200 million-year-old fault, which has a northeast to southwest orientation, is near Schaefferstown in Lebanon County, Pa., according to information from Columbia University's Earth Institute.

The Ramapo fault line has several smaller fault systems associated with it, including the Chalfont, Flemington and Hopewell faults, but maps seem to show it traversing Pennsylvania several miles to the north of the immediate area near Limerick.

Although this fault is not known for major tremblors, several earthquakes have been recorded in its proximity, most of them in northern New Jersey.

The most recent were two small earthquakes recorded there in February 2009.

Sheehan said he does not know if the Ramapo fault was a factor in the NRC's decision to put Limerick on the list of plants that will be getting an updated seismic analysis.

The most powerful recorded earthquake in Pennsylvania was 5.2 in 1998 in the northwestern part of the state.

In 1984, a earthquake that registered 4.1 on the Richter scale occurred in Lancaster County. The epicenter of that quake was near the Peach Bottom nuclear plant in York County, according to the Lancaster Intelligencer-Journal.

Peach Bottom, which is also owned by Exelon, is also on the list of plants which will get a new

earthquake assessment from the NRC, that newspaper reported.

That plant placed 34th on the earthquake risk rankings compiled by MSNBC.

Although the latest NRC study has altered the risk statistics for the nation's plants, the agency does not conclude that this risk is inordinately high.

"Overall seismic risk estimates remain small," notes the NRC report, released Sept. 2, 2010. "There is no immediate safety concern."

However, several factors pushed the NRC to take a closer look at certain plants.

The primary cause is a better understanding of seismology resulting from better equipment, better measuring and better computer models.

So in 2008, the U.S. Geologic Survey updated its assessment of seismic threats.

Among the changes was "a broader range of earthquake magnitudes for the central and eastern U.S.," according to a USGS release on the update.

Another important change was "several new and updated ground-shaking models for earthquakes in the central and eastern U.S. were implemented in the maps," USGS wrote.

In effect, nothing has changed but the government's understanding of how earthquakes work, what those changes mean to specific locations, and how that new understanding could affect what the agency previously considered the risk of earthquake damage to be.

Consider for example that the risk rankings put together by MSNBC from the new NRC study do not put plants in California, Oregon or Washington near the top of the list.

That's because the earthquake risk was more pronounced in those locations and those plants were built with additional protections to account for that higher risk.

The earthquake risk at Limerick, by contrast, was considered low when its two reactors were commissioned, the first in 1985 and the second in 1989. As a result, it was not designed or built with the necessity of withstanding a major earthquake in mind.

And the NRC study may well find that the precautions in place are adequate. Or it may require some retrofitting at the plant, which Exelon will undertake if required, Szafran said.

"These things change as new information becomes available," said Szafran. "New data becomes available and agencies have to respond to that. We understand that. Who knows, maybe in another ten years, more data will be available and our numbers will be re-adjusted again."

Nevertheless, said Szafran, "Our top priority is the health and safety of the community and our employees."

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CORROSION A MAJOR CONCERN REGARDING LIMERICK'S DEADLY WASTES

Research validates ACE concerns about corrosion of steel storing deadly wastes at Limerick Nuclear Plant.

The more deadly wastes produced and stored at the Limerick Nuclear Plant site, the greater the risks to the entire region.

How long will it take for steel to corrode that holds high-level radioactive wastes above ground in our back yard at Limerick Nuclear Plant?

- 2006 Testimony to Congress by Public Citizen - Provided evidence of scientific misconduct by NRC and DOE related to corrosion rates of metals used to store nuclear wastes.
 - ✓ In 2005 NRC found problems with the corrosion rates of metals used to store nuclear waste, yet failed to address the corrosion problems.
 - ✓ Research identifying corrosion problems was stopped, not the use of steel that would corrode.
- 2006 NRC dismissed important evidence identified by ACE related to corrosion of steel planned to hold Limerick's high level radioactive wastes in above ground casks.
 - ✓ Every day Limerick adds 324 pounds of toxic chemicals to cooling tower waters. MSDS sheets identify 10 of them to be corrosive, some highly corrosive and some specifically corrosive to steel.
 - ✓ There is NO FILTRATION to prevent them from entering our air.
 - ✓ Synergistic combinations of the corrosive additives can result in a serious corrosive threat to people and everything exposed to the drift from the cooling towers (35 to 42 million gallons every day), including steel holding deadly radioactive wastes stored inside casks that require cooling with outdoor air.
 - ✓ This corrosive air enters casks holding high-level radioactive waste rods stored in steel.
 - ✓ NRC admits corrosion will happen, yet dismissed ACE concerns without site specific testing of cooling tower emissions for specific and conversion corrosives.
 - ✓ NRC's dismissive, misleading, and irresponsible conclusions defy logic. They can lead to irreparable disaster in our region.
 - ✓ Corrosion can make it difficult, if not impossible, to move these extremely heavy casks. To date, there is no proof they can be moved safely after years of exposure to corrosive air.
- July, 2006 Areva, the company making Limerick casks, received a Notice of Violation, documenting specific problems with casks already in place, yet NRC allowed casks for Limerick to continue to be built by this company.
- November, 2006 in a whistle blower letter it was revealed that there were specific concerns about casks planned to be used at Limerick.
- In an 11/06 letter to ACE, both NRC and Transnuclear (Areva) admitted there would be corrosion and settling of ground beneath 40 ton casks.
 - ✓ No one knows how long it will take for nuclear waste storage containers to break down from corrosion and leak – It is only a matter of time.

NRC Research Validates ACE's Corrosion Concerns

RE: Steel In Limerick's Casks For High-Level Radioactive Wastes And The Need For Corrosive Air Testing At Limerick Nuclear Power Plant

- Since the fall of 2005, NRC was aware of corrosion problems on steel to hold high-level radioactive wastes.
- Yet, October, 2006, NRC irresponsibly dismissed a nuclear engineer's concerns about corrosion of steel planned to hold Limerick's high-level radioactive wastes.
 - ✓ NRC did not base its conclusions on site-specific air monitoring for corrosives in Limerick's air, but instead on unsubstantiated conclusions of the cask company that has a vested interest in the outcome.
 - ✓ The air continuously cooling Limerick's high-level radioactive wastes in steel canisters could be extremely corrosive for several reasons, such as:
 - ✓ Exelon adds corrosive chemical additives to Limerick's cooling tower waters.
 - ✓ 35,000,000 million gallons of steam are emitted from the towers into the air in Limerick every day. This air will cool steel holding the waste. Corrosives in the air could present an enormous problem.

NRC's Reaction And Conclusions Validate ACE's Concerns

RE: NRC's Scientific Misconduct and Irresponsible Conclusions

- Fall 2005 NRC FOUND PROBLEMS WITH CORROSION RATES OF METALS used to store nuclear waste, YET CRITICIZED THE REPORT AND STOPPED RESEARCH
- Instead of attempting to address corrosion problems discovered by their own research, NRC criticized the research. DOE unfortunately stopped that research.

The quote below is taken from Page 2 of the September 13, 2006 Testimony to the Subcommittee on Energy and Air Quality in the U.S. House of Representative
From Michele Boyd, Legislative Director, Public Citizen's Energy Program.

New Cases Of Scientific Misconduct Continue To Surface.

One of the more recent revelations:

- In January 2006, the NRC staff released a critical report of a Bechtel SAIC LLC (BSC) audit made last fall at Lawrence Livermore National Laboratory. The Bechtel audit was on research related to corrosion rates of the metals to be used to construct the waste packages and drip shields. The NRC found that researchers incorrectly measured the amount of corrosion on the metals, and overestimated the ability of the metals to isolate nuclear waste in engineered packages. The NRC also found that researchers failed to calibrate equipment, used equipment beyond its verifiable accuracy range, and referenced cancelled documents. According to the NRC's audit report, "the NRC observers questioned whether the corrosion data could be considered technically sound and defensible."³ Because of the problems NRC discovered, DOE issued a stop work order on all cask research.
- In December 2005, DOE instructed BSC, its main contractor, to cease engineering work and safety assessment on key areas of design, including the redesign of the surface facility. This order was the result of QA and design control deficiencies, which were revealed by a ¹ Matthew L. Wald, "Big Question Marks on Nuclear Waste Facility," New York Times, February 14, 2006. ² U.S. Department of Energy, Office of Inspector General, "Audit Report: Office of Civilian Radioactive Waste Management's Corrective Action Program," August 2006, DOE/IG-0736, <http://www.ig.doe.gov/pdf/IG-0736.pdf>. ³ U.S. Nuclear Regulatory Commission, "U.S. Nuclear Regulatory Commission Observation Audit Report No. OAR-05-05, Observation Audit Of Bechtel SAIC Company, LLC Internal Audit BQAP-BSC-05-07," January 9, 2006. ² whistleblower. ⁴ Despite Bechtel's failings, DOE nevertheless extended its contract for another year, with an option for a second year

Corrosive Chemicals

Added to Limerick Nuclear Power Plant's Cooling Tower Waters

Based on our concern about corrosion of steel canisters, parts, and structures which are planned to hold Limerick Nuclear Power Plant's deadly high-level radioactive wastes, The Alliance For A Clean Environment (ACE) has launched an investigation into chemical additives used by Exelon in Limerick's cooling tower waters. For more information call ACE (610) 326-6433.

In 2004, ACE received MSDS information from Exelon on chemicals Exelon adds to the cooling waters at Limerick Nuclear Power Plant. Based on government research, below is a list of chemicals from Limerick's MSDS sheets which are corrosive.

1. **Sulfuric Acid - Corrosive to metals**
2. **Phosphoric Acid - Corrosive to steel and most metals**
3. **Phosphonic Acid - Corrosive to steel**
4. **Hypochlorous Acid - Corrosive**
5. **Zinc Oxide - Breaks down structures such as steel**
6. **Sodium Hydroxide - Corrosive to metals**
7. **Sodium Hypochlorite solution - Hypochlorous Acid - Corrosive MSDS Warning**
8. **Sodium Per sulfate - Says to avoid moisture - Incompatible with most metals**
9. **Sodium Bromide and Water - Corrosive**
10. **Ethyl Alcohol - Weak acid which can be Corrosive**

This list of corrosive chemicals added to Limerick Nuclear Power Plant's cooling tower waters, provides valid justification for NRC to do a comprehensive site-specific investigation into corrosive air that will be cooling the above ground high-level radioactive wastes placed in steel canisters at Limerick.

Limerick's massive amounts of steam emitted into our air every day could include these corrosive chemicals and their synergistic combinations. They would add to already corrosive air from other nearby pollutants.

35 MILLION GALLONS of steam are discharged into our air every day from Limerick's cooling towers. We must know exactly what corrosive chemicals are discharged with that steam, especially in the exact location of the proposed casks planned to store Limerick Nuclear Power Plant's high-level radioactive wastes.

Corrosives will be in the air constantly cooling the steel canisters and structures holding Limerick's high-level radioactive wastes, possibly for centuries. Only year-long air monitoring for all potential corrosives and their synergistic combinations will identify the degree of corrosive air which will attack the steel within the casks.

ACE rejects NRC's deceptive, illogical claim that most Limerick corrosive chemicals magically disappear through reactions. To substantiate such an illogical claim, NRC must provide independent year-long continuous air monitoring data for all corrosives, in the location of Limerick's proposed casks.

It appears there is no continuous air monitoring or even occasional testing in Limerick's air by Exelon, NRC, EPA, or DEP, for all potential corrosives and their synergistic combinations. How could any of them accurately model the amount of corrosion that will take place on canisters or structures holding Limerick's high-level radioactive wastes, over decades or centuries?

- **BEFORE casks are built and loaded at Limerick, one year of independent air monitoring is crucial, in the exact location of the casks, for all corrosive chemicals and synergistic combinations, emitted into the air from Limerick's cooling towers and nearby pollutants. Corrosion modeling with accurate corrosive air data could lead to precautionary action.**

LIMERICK NUCLEAR POWER PLANT

USES HAZARDOUS SUBSTANCES

TO TREAT SCHUYLKILL RIVER & PERKIOMEN CREEK WATER
MILLIONS of GALLONS of WATER get SUCKED IN EVERY YEAR

How do these chemicals increase air pollution health threats?

They synergize and add to Limerick's radiation emissions!
Mist from the river water is continuously emitted into our air.

1. **SULFURIC ACID** – synonym: battery acid

Various concentrations used as a liquid – On EPA Hazardous Substance List

Health Impacts:

- International Agency for Research on Cancer (IARC) classified "strong inorganic acid mists containing sulfuric acid" as a Category 1 carcinogen, a substance that is "carcinogenic to humans."
- Inhalation of fumes or ACID MIST can cause:
 - a. Irritation or corrosive burns to the upper respiratory system, including nose, mouth, and throat.
 - b. Lung irritation and pulmonary edema can also occur
- Can cause severe burns
- Eyes – mist contact may irritate or burn eyes
- Unusual chronic toxicity such as around Limerick
 - a. Erosion of teeth
 - b. Lesions of the skin
 - c. Tracheo-bronchitis
 - d. Mouth Inflammation
 - e. Conjunctivitis
 - f. Gastritis

2. **Corrosion Inhibitor** – AZ8104 - Ingredients:

- A. **CHLOROTOLYLTRIAZOLE SODIUM SALT** - Potential Irritant
- B. **DICHLOROTOLYLTRIAZOLE** - Potential Irritant
- C. **BENZOTRIAZOLE, METHYL, SODIUM SALT** - Corrosive (eyes and skin)

Potential Health Impacts:

- ACUTE SKIN EFFECTS – primary route of exposure - May cause irritation to the skin
- ACUTE EYE EFFECTS: Severe irritant to the eyes
- ACUTE RESPIRATORY EFFECTS: Mists/aerosols may cause irritation to upper respiratory tract.
- TARGET ORGANS – Prolonged or repeated exposures may cause primary irritant dermatitis.

Aquatic Toxicology show effects on fish.

Must be discarded as HAZARDOUS WASTE.

3. **Microbial Control Agent** – Ingredients:

A. (C12-16) ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE

Corrosive (eyes and skin)

B. ETHYL ALCOHOL (ETHANOL)

Irritant (eyes) Potential liver and kidney toxin

May cause CNS depression

Potential Health Effects

- 1) ACUTE SKIN EFFECTS: Primary route of exposure
Severe irritant to the skin. Potential skin sensitizer.
- 2) ACUTE EYE EFFECTS: Corrosive to eyes
- 3) ACUTE RESPIRATORY EFFECTS: Vapors, gases, mists and/or aerosols may cause irritation to upper respiratory tract.

- 4) TARGET ORGANS: Prolonged or repeated exposures may cause CNS depression, skin sensitization, and/or toxicity to the liver and kidney.
- 5) SYMPTOMS OF EXPOSURE: Inhalation of vapors/mists/aerosols may cause severe irritation or burns.

Registered EPA Biocide – must be disposed as hazardous waste
 Considered a SERIOUS HAZARD

4. **Sodium Hypochlorite Solution**. Synonym: **CHLORINE BLEACH**

PRECAUTIONARY STATEMENTS
 HAZARDOUS TO HUMANS AND DOMESTIC ANIMALS
 TOXIC TO FISH AND AQUATIC ORGANISMS – PESTICIDE

Health Impacts:

- 1) INHALATION: Inhalation of hypochlorous acid fumes may cause severe respiratory tract irritation and pulmonary edema.
- 2) SKIN: Skin contact may cause severe irritation and burns
- 3) EYE CONTACT – Eye contact may cause severe irritation and burns
- 4) CHRONIC EFFECTS – No Data

Exposure Limits:

Hypochlorous Acid, Sodium Salt – 1 ppm
 Sodium Hydroxide – 2 ppm ceiling
 Not tested for carcinogenic effects

5. **Foamrol AF 1441 – ANTIFOAM – Hazardous Ingredients**

- A. **Distillates (PETROLEUM), SOLVENT refined and/or severely hydrotreated paraffinic** – Potential irritant
- B. **ALCOHOLS, (C-16) Irritant (eyes) may cause defatting-type dermatitis**

Potential Health Effects:

- 1) ACUTE SKIN EFFECTS: Primary route of exposure; May cause slight irritation to the skin. May cause dermatitis
- 2) ACUTE EYE EFFECTS: May cause moderate irritation to eyes
- 3) ACUTE RESPIRATORY EFFECTS: Mists / aerosols may cause irritation to upper respiratory tract.
- 4) TARGET ORGANS: Prolonged or repeated exposure may cause defatting-type dermatitis
- 5) Symptoms of exposure – redness or itching of skin.

6. **FLOGARD MS 65210 – CORROSION INHIBITOR – Ingredients:**

- A. **PHOSPHORIC ACID – Corrosive**
- B. **ZINC SULFATE – Severe Irritant; potential reproductive toxic**
- C. **ZINC OXIDE – Nuisance Particulate**

Potential Health Effects

- 1) ACUTE SKIN EFFECTS: Primary route of exposure: Severe irritant to the skin
- 2) ACUTE EYE EFFECTS: Corrosive to the eyes.
- 3) ACUTE RESPIRATORY EFFECTS: Mists/aerosols cause irritation to the upper respiratory tract.
- 4) TARGET ORGANS: Prolonged or repeated exposures may cause primary irritant dermatitis. Product component may cause reproductive toxicity at maternal toxic levels (based on animal testing)
- 5) SYMPTOMS OF EXPOSURE: Inhalation may cause irritation of mucous membranes and respiratory tract. Skin contact causes severe irritation or burns.
- 6) Considered a SERIOUS HEALTH HAZARD

Summary from Material Safety Data Sheets (MSDS)

Obtained by ACE from Limerick Nuclear Power Plant Public Relations - Under FOIA

For complete information call The Alliance For A Clean Environment (ACE)

(610) 326-6433

Chemicals Added To Cooling Water System At Limerick.

NRC states:

1. *"They are standard water treatment chemicals used around the world."*

ACE believes that just because something is done elsewhere is not an excuse to dismiss a threat at Limerick.

2. *"These chemicals are selected to treat or prevent specific conditions which would otherwise damage the plant water system components. Damage to the system could be in the form of corrosion, formation of biological growths, or other mechanisms."*

ACE concludes that while these chemicals may protect Limerick's interests, MSDS sheets on those chemicals added at Limerick suggest there is cause for concern to all who are exposed.

3. *"Chemical use must be compatible with environmental regulations."*

Based on failure of regulations to deal with additive, cumulative, and synergistic impacts on human health, or to acknowledge the most recent research showing chemicals to be far more harmful than first thought, ACE suggests this statement does not insure protection to anyone exposed to these chemicals.

NRC Comments About Limerick's Water Treatment Chemical Additives Effects On Metals:

SULFURIC ACID

Used At Limerick For Cooling Tower Water Treatment

NRC States:

1. *"Sulfuric Acid is used to prevent scaling – the ever-accumulating, non-conductive, rock-like coating. ("scale") forms on insides of pipes, heat exchangers, and other components, hindering or crippling their ability to function."*
2. *"ACID ADDED is totally consumed in reacting with the naturally occurring alkalinity of the water that is partly responsible for scale formation."*
3. *"NO ACID REMAINS - Chemical reaction between the acid and alkalinity of the water produces water and a salt."*
4. *"With the acid addition, the pH of the cooling water system is maintained at 8.25, which is still well within the alkaline range where steel corrosion is "MINIMAL", but low enough to inhibit scale formation."*
5. *"NO Acid remains to be discharged through the plant water system or cooling tower."*

- ACE believes only continuous monitoring can prove that the pH is always maintained at 8.25 and that NO Sulfuric Acid is discharged into the air or water. There are valid reasons for variations that would lead to excessive acid emissions.

SODIUM HYPOCHLORITE, SODIUM BROMIDE, BIOCIDES

Used At Limerick For Cooling Tower Water Treatment

1. "These biocides prevent and control biological growths such as algae, slime, etc within the cooling the system and cooling tower"
2. "Some are identical to swimming pool water treatment chemicals. Concentrations at Limerick are about 1/10 of what would be used in a swimming pool."
 - ACE believes this is of particular concern since swimming pool chemicals usually contain chlorine chemicals which could be a serious threat to human health when released with 35,000,000 gallons of steam every day, even at very low levels.
3. "This concentration level avoids adverse effects on metallic components in the water system."
 - ACE questions this conclusion. Could this be one reason there has been so much trouble with equipment at Limerick?
 - NRC has no way of knowing exact amounts of any of the additive chemicals.
 - Employees informed ACE of accidents where a lot more chemicals were added than were supposed to be added.

MILD ACIDS or OXIDIZERS

1. "Mild acids or oxidizers inhibit formation of damaging scale by reacting with scale forming chemicals ... and render them into a chemical form which does not create scale.
2. "Inhibitors are totally consumed by this process."
3. "NONE remain to adversely affect metallic components."
 - There is no site specific testing to validate this claim

ACE CONTINUES TO BELIEVE THAT CORROSIVE CHEMICALS ADDED TO LIMERICK'S COOLING WATER COULD BE A THREAT TO PUBLIC HEALTH AND THE STEEL HOLDING HIGH-LEVEL RADIOACTIVE WASTES IN THE ABOVE GROUND CASKS WHICH NEED TO BE CONTINUOUSLY COOLED WITH SURROUNDING AIR.

- **NRC HAS FAILED TO DO SITE-SPECIFIC TESTING TO PROVE OTHERWISE**
- **NRC OBSERVATIONS DO NOT PROVIDE PROOF.**

1. NRC states "MOST of the chemicals used are benign to metals." ACE believes this shows some chemicals added to Limerick's cooling water are a threat. Logic suggests NRC cannot not accurately determine how much of a threat without continuous monitoring.
2. NRC states "chemicals potentially harmful to metals are totally consumed by chemical reactions or not present or used in concentrations low enough to not be a concern." ACE believes this statement is based on information which has never been proven to be absolutely true at Limerick. Without continuous independent monitoring at Limerick neither conclusion can be proven to be totally accurate.
3. "NRC staff finds no potential adverse impact upon the metallic components of the NUHOMS design at Limerick." ACE believes without continuous long term air testing, it is illogical and irresponsible to conclude that sulfuric acid and other corrosive chemicals added to the cooling water at Limerick are not emitted with the 35,000,000 gallons of steam every day.

From NRC Letter To ACE October 17, 2006
→ Robert O'Connell - Office of Nuclear Safeguards

2

Allegation: NMSS-2006-A-0010

corrosion. TN further maintained that because the Limerick site is located inland, it is not subject to the severe coastal climates.

In addition to the response provided by TN, Limerick Generating Station, in a July 28, 2006, letter sent from Thomas Basso, Exelon, to Jayant Bondre, TN, provided circulating water-chemistry data to TN so that TN could evaluate the allegation. In a separate phone call to the NRC staff, TN indicated that the data provided in Exelon's July 28, 2006, letter did not change any conclusions contained in TN's response to the allegation, and that it would not be necessary for TN to supplement its previous response. The chemical additives that Exelon uses at the Limerick Generating Station are evaluated by the staff in its evaluation below.

Staff Evaluation

The NRC staff evaluated the responses provided by TN and Exelon, as well as the information provided by the Concerned Individual (CI), and performed its own evaluation of the issue as discussed below.

Regarding the general concern about corrosion of the canister support structure, the staff believes that this issue has been addressed based on the following:

- The steel specified for construction of the canister support structure has a calculated corrosion rate that is conservative and takes into account the expected corrosion over the 20 year licensing basis for the design.
- Transnuclear, Inc. has specified the application of a corrosion resistant coating over the support steel. The coating may be one of several systems. One system consists of an inorganic zinc primer with an epoxy overcoat. This is an industry recognized, high performance, long-lived, industrial coating system that is designed to withstand very severe environments. Although the coating is specified, it is not credited in the corrosion rate calculations that are part of the structural steel design margins.
- → The steel is enclosed in a dry, interior-like environment, that provides additional protection against corrosion. *Not Accurate*

Therefore, the staff concludes that the Standardized NUHOMS® design provides reasonable assurance that the system will not experience any significant corrosion during the 20-year license period. *Irresponsible*

Regarding the chemicals employed at Limerick Generating Station, the chemicals which are added to the cooling water system at Limerick are standard water treatment chemicals used around the world. These chemicals are selected to treat or prevent specific conditions which would otherwise damage the plant water system components. Damage to the system components could be in the form of corrosion, formation of biological growths, or other mechanisms. In addition to performing this function, chemical use must be compatible with environmental regulations.

Specific chemicals or chemical types which are used at Limerick include the following, along with a comment about their purpose and effect upon metals:

5

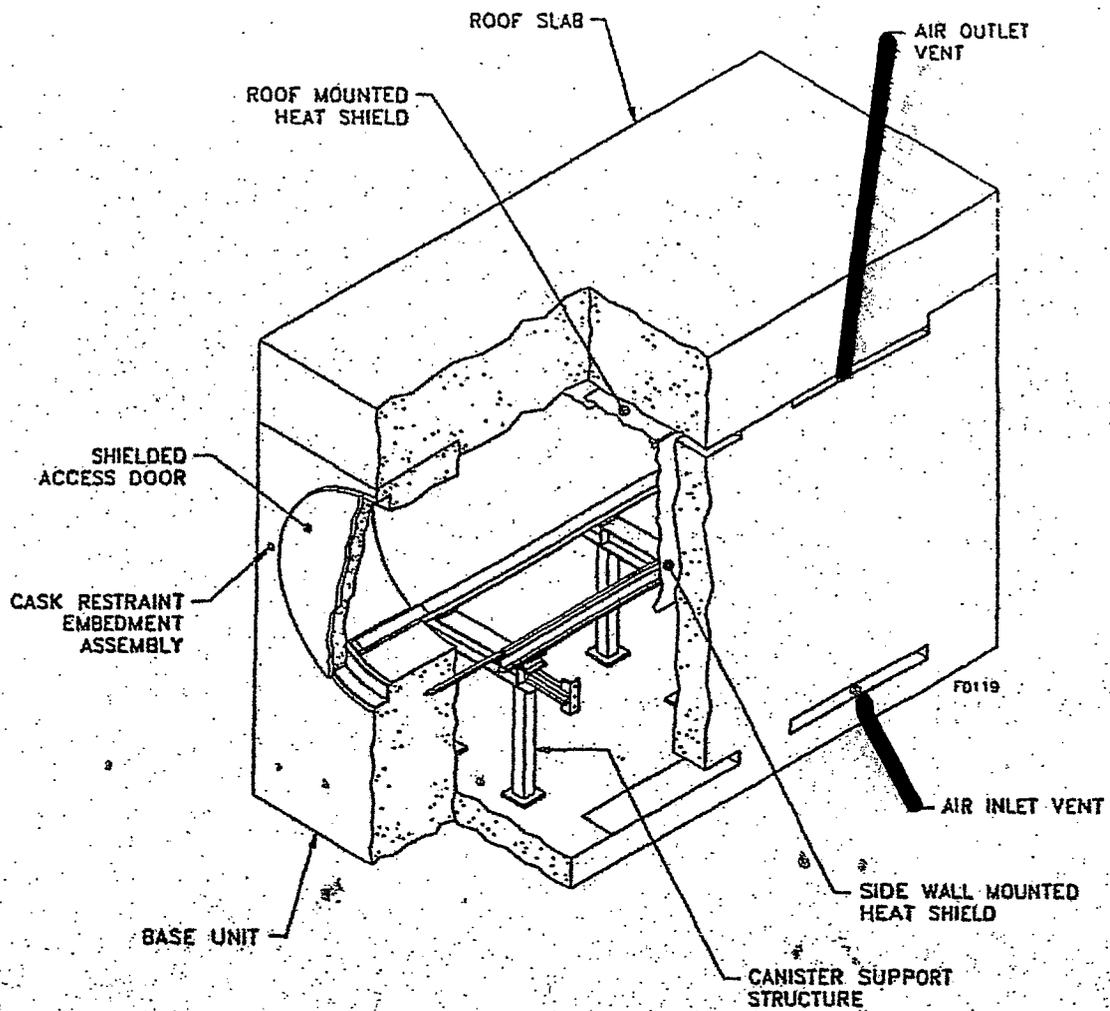


Figure 1.2-2
Prefabricated NUHOMS[®] Horizontal Storage Module

**Limerick Nuclear Power Plant's Air Pollution Threat
In Addition To The Toxic Brew Of Radiation Emitted Regularly.**

**What Health Impacts Result From Radiation and Other Harmful Chemicals
Emitted Into Our Air Every Day With
Limerick Nuclear Power Plant's 35 Million Gallons Of Steam?**

**Material Safety Data Sheets (MSDS) Prove
TOXIC and CORROSIVE CHEMICALS ARE ADDED
To The River Water Used To Cool Limerick's Towers**

**NO ONE KNOWS WHAT LEVELS OF THOSE TOXIC AND CORROSIVE
CHEMICALS ARE EMITTED INTO THE AIR WITH LIMERICK'S STEAM.**

- Toxics Added Do Not Disappear. Logic suggests they are emitted with the steam. It appears no independent air monitoring has been done for those toxic, corrosive chemical additives, or their synergistic combinations.
- See Summary Of Harmful Health Impacts From MSDS On Limerick's Added Chemicals.

And

**Limerick Nuclear Power Plant
DOES NOT FILTER OUT TOXICS ALREADY IN
RIVER WATER USED TO COOL THE TOWERS.**

**Limerick Nuclear Power Plant's Schuylkill River Intake Contains
Extremely Hazardous Substances From Discharges Directly Upstream.
NO ONE KNOWS AT WHAT TOXIC, CORROSIVE CHEMICALS AND
THEIR SYNERGISTIC COMBINATIONS ARE EMITTED
INTO THE AIR WITH LIMERICK'S STEAM EVERYDAY.**

- The Occidental Chemical Superfund Site is discharging contaminated groundwater into the Schuylkill River less than 1 mile upstream from the Limerick Nuclear Power Plant.
- Pottstown's Waste Water Treatment Plant is less than 2 miles from the Limerick Nuclear Power Plant. Effluent is emitted into the Schuylkill River with only a fraction of toxics tested or filtered out from massive amounts of extremely hazardous Pottstown Landfill leachate arriving daily.

For More Information Contact The Alliance For A Clean Environment (610) 326-6433

**Comments and Concerns From A Nuclear Engineer
About Cask Design Flaws By Company Making Limerick Casks**

ACE received information from a nuclear engineer. While the letter we received expressed specific concerns about NUHOMS casks for another nuclear power plant, the same concerns are relevant for the same casks proposed for Limerick Nuclear Power Plant, possibly with even worse threats and potential consequences.

ACE is officially requesting NRC to investigate and respond to each of the nuclear engineer's statements and concerns clearly identified in this attachment about NUHOMS casks. As stated in our letter, biased answers from the company about their cask products are unacceptable as responses to this attachment. On behalf of our very heavily populated region, we have the right to expect comprehensive, researched answers, guarantees, and requirements from NRC, the agency charged with and paid with public tax dollars for protecting public safety against nuclear power plant issues and wastes.

- **We believe NRC should comprehensively do a hands-on investigation of each of the issues raised by the nuclear engineer which ACE identified in this Attachment.**
- **ACE is requesting a written report from NRC, to include all findings concerning each of the nuclear engineer's allegations, and addressing related concerns specific to Limerick Nuclear Power Plant which follow each of the nuclear engineer comments.**
- **PLEASE PROVIDE THE NRC INVESTIGATIVE REPORT TO ACE AT LEAST 60 DAYS PRIOR TO ANY CASK PUT INTO PLACE AT LIMERICK NUCLEAR POWER PLANT.**

- Listed below in italics and quotes is the list of statements and concerns sent to ACE by a nuclear engineer.
- Following each of the nuclear engineer's statements are comments and questions to be answered and addressed from ACE.

- I. The nuclear engineer wrote, ***"Technology used by Areva for NUHOMS is old and downright dangerous."***

ACE's investigation suggests there are safer technologies. For example ACE is requesting that NRC require far thicker steel for casks used at Limerick. Common sense suggests thicker steel for above ground casks would provide extra protection for these inviting terrorist targets.

Steel used for casks:

- a. Transnuclear plans to use casks at Limerick with less than 1" steel
- b. Video proves German Holtec casks, made of 15" cast iron (considered by some to be the Cadillac of casks) were penetrated by army missile testing.

ACE is requesting that NRC require Exelon to bunker Limerick casks to avoid easy detection.

- To minimize damage from a terrorist attack, the cement housing should be of the finest grade and far thicker than that currently proposed by Transnuclear
- Casks should be spread out to minimize the target so that a large-scale explosive attack would involve only a limited number of casks.

Casks are exposed terrorist targets:

- a. Casks are easily identifiable and vulnerable to terrorist attack being outdoors and concentrated in rows in plain view. They are pre-deployed weapons of mass destruction. They are potential targets for attacks using remotely fired anti-tank missiles or other special weaponry.
- b. March 27, 2006, the Transnuclear salesman dismissed ACE concerns about missiles and air strikes with a deceptive statement, "casks are low profile."

- c. Height of casks does not dismiss concerns about terrorist attacks. Casks are well over six feet high. Video of the commercial aircraft hit at the Pentagon disputes Transnuclear's misleading low profile rhetoric.
 - d. Enormous, expansive casks make a significant target, for a suicide air strike, even with a small aircraft.
2. The nuclear engineer wrote, ***“NUHOMS is designed for air to enter the inside of the concrete structure which holds the radioactive waste containers. It is only a matter of time before the steel tubes turn to rust. These tubes are not visible or accessible. The 40-ton radioactive waste containers ‘filled with the nastiest of man-made stuff’ are placed on a set of steel columns. The containers lie horizontally, six feet up in the air, resting unfastened, on that set of steel columns, which are bound to deteriorate in the corrosive air environment. What happens when they cannot hold the weight of the container and the container comes crashing down to the concrete surface below? There’s no proof the container is strong enough to remain intact after falling six feet. Imagine the catastrophe from dozens of these cylinders crashing to the ground.”***

- a. The industry has taken the unverifiable position that the steel proposed for Limerick casks will not corrode. That is likely true under most conditions. However, we know the casks at Limerick will be actually blown to cool with extremely corrosive air, 24 hours a day, 365 days a year for decades, if not forever.
- b. We do not believe that under the extremely corrosive conditions at Limerick Nuclear Power Plant, that either NRC or the industry can provide actual proof that the steel will not corrode after having such corrosive air constantly blown over it year after year for decades.
- c. The steel planned for Limerick casks has not been in place in extremely corrosive conditions such as exist around Limerick for a long enough time to guarantee there will not be corrosion over decades of exposure, especially on the welded areas.

Extreme moisture and corrosive chemicals are present in the air that would be constantly circulated around the steel casks at Limerick, 24 hours a day.

- Limerick Nuclear Power plant emits about 35 MILLION GALLONS of steam into the air every day that would be actually circulating around the steel holding the radioactive wastes 24 hours a day, every single day.
- Multiple extremely corrosive chemicals are added to the 35 million gallons. (MSDS sheets obtained by ACE verify this). Common sense suggests that corrosive chemical additives are emitted with the 35 MILLION GALLONS of steam emitted every day.
- Limerick Nuclear Power Plant is bordered over an extensive area by the Schuylkill River, another source of moisture in the air.
- Sulfur compounds are of major concern. Just 5 miles upwind from Limerick Nuclear Power Plant, the Pottstown Landfill emits massive amounts of sulfur compounds into the air. There are other industrial air pollution sources of sulfur compounds immediately upwind from the nuclear power plant.

ACE requests that NRC require the following improvements in the cask design for Limerick Nuclear Power Plant. We believe these are crucial precautionary measures for this risky endeavor:

- Use of the only best grade of non-corroding stainless steel, with certification from the steel producer that they will be liable under these conditions. We understand that 304 may not be the best non-corroding steel and that even with 304 there can be inferior quality depending on where it is produced.
- Certificated welds on caps, with those responsible signing to be liable under the conditions at Limerick. There have already been problems with welding on casks elsewhere.
- Requirements that the six foot steel columns be fastened to the cement floor.

- Sulfuric acid testing over at least one year, with continuous exposure to the same kinds of moist, corrosive air conditions that exist at Limerick.
 - An MRI arrangement for continuous monitoring for corrosion inside the cask where it may otherwise be impossible to detect corrosion, as well as continuous heat monitoring around the casks.
 - All monitoring data should be wired electronically to the NRC office on-site at Limerick, continuously recorded electronically, and available to the public at all times.
3. The nuclear engineer states that ***“Radiation leaks out of ventilation openings in concrete walls. Air which enters the concrete structure is needed to constantly cool off the contents inside the container. After the air is circulated, it exits into the air outside.”***
- a. Experts we contacted suggest this would happen with slow leaks or sudden accidents.

ACE objects to visual inspections for several reasons. You can't see radiation and workers could face unnecessary risk. And a once a week or two week inspection is hardly protective. We understand that visual inspections only happen once every two weeks at another nuclear plant.

CRUCIAL NRC MONITORING REQUESTED WITH DATA IMMEDIATELY AVAILABLE TO THE PUBLIC AT A SPECIFIC WEBSITE

- ACE is requesting that air monitors to detect all kinds of radiation be placed on each side of the casks at elevations likely to detect problems immediately. Monitoring data should be directed to the NRC office on-site and checked at regular intervals during each day. All data, along with NRC reports on the data, should be posted at a website that the public can continuously review.
 - ACE is also requesting that heat monitors collect data 24 hours a day, directed into the NRC office at Limerick Nuclear Power Plant, with readings by NRC taken at the beginning and end of each shift for NRC each day. All data and reports should be immediately available to the public at a specific announced website, along with a daily report posted on line for public review
4. The nuclear engineer states, ***“NRC law “Part 21” states that if a company knows of a defect in its product used at nuclear plants, it is supposed to notify NRC. Areva knows it installed dozens of containers around the country in which the steel tubes may be rusting away, completely undetected (because the outside of the tubes is not visible and the insides of the tubes are completely out of sight). Instead of admitting to the defect in the NUHOMS design and making changes before a tube structure collapses somewhere, Areva has been silent. Lack of (Transnuclear/Areva) action to notify NRC is a direct violation of the law (Part 21) and a shameful neglect of responsibility.”***
- ACE is calling on NRC to do a complete investigation into this alleged violation by the nuclear engineer.
 - If NRC finds this is a valid concern, we ask NRC to require precautionary changes to the NUHOMS cask design to reduce the risk of unnecessary corrosion at Limerick Nuclear Power Plant.
5. The nuclear engineer states, ***“Pushing 40-ton containers of highly radioactive wastes into the container is a risky operation, especially for workers that could be irradiated.”***
- There have been reports of accidents and incidents with this operation. Human error has caused near catastrophes.
 - Exactly how are workers protected from the kinds of disasters that could happen?
6. The nuclear engineer states, ***“To solve a problem from corrosive air or settlement of the ground below under the weight of the 40-ton-plus container and its concrete***

housing, or to dismantle the storage facility at the end of its life, you must be able to pull the container out of the NUHOM concrete housing.”

- Transnuclear stated they must demonstrate they can pull the container back out before loading them and there is no problem with doing that. That is deceptive. Of course this can be done before it is loaded with deadly spent fuel and before any settling or corrosion takes place.
 - The only instance we can find where this was attempted after a problem took place, it failed. The defective cask is still loaded with deadly fuel and sitting at the same location where it will threaten an entire region forever.
 - We ask NRC to provide proof that containers were successfully pulled back out and unloaded after there was a problem. Please include location, length of time the cask was loaded, the problem which caused the unloading, detailed description of specific problems, and what was done with the defective load.
7. The nuclear engineer states, **“If you can’t pull the containers out, you cannot transport the container to Yucca or anywhere. The site will become a permanent graveyard for nuclear fuel - a waste dump full of hundreds of millions of curies of radioactivity that takes over a million years to die down, in the back yard of this region forever.”**
- This statement is obvious and profound. Exelon admits these containers will sit at Limerick for many years before there is any attempt to move them to Yucca or somewhere else. During that time there is bound to be settlement and we believe a good possibility of corrosion making removal of wastes doubtful and extremely dangerous.
 - Based on the circumstances surrounding Yucca Mountain, we doubt all this high-level nuclear waste will ever be moved off the Limerick site and question the safety of transport both from accidents and creating even more inviting targets as radiological weapons for terrorists.
 - As far as we are concerned this is a ticking time bomb for which there is no good answer. As long as Limerick continues to operate, more of this high-level radioactive waste will continuously be filling the fuel pools, requiring more and more above ground high-level radioactive waste storage, continuously adding to the threat.
 - This is a major reason we call upon NRC to get this right, here and now.
8. The nuclear engineer states that **“DOE will not use the NUHOMS design for the storage facility planned to be built in Nevada, because, among other concerns, DOE is concerned about the feasibility of removing the container after some period of storage due to settlement. DOE does not even consider NUHOMS to be fit for use in a dry desert away from population centers.”**
- Why would NRC allow NUHOMS technology at Limerick, where an enormous population, settlement, and corrosion are all major factors, when DOE does not consider NUHOMS to be fit in a dry desert away from population centers in Nevada? PLEASE ADDRESS THIS QUESTION WHICH YOU EXCLUDED IN YOUR MAY 24 ATTACHMENT.
 - Based on DOE’s rejection of NUHOMS casks, ACE is urging NRC to reject the NUHOMS design for the Limerick Nuclear Power Plant, where the potential for problems can be even greater than in Nevada.
9. The nuclear engineer states, **“NUHOMS module is not even made by pouring concrete. Pre-cast concrete blocks are trucked to the site, assembled by bolting the blocks together. They are not even anchored to the concrete floor. A rectangular box made by field assembling pre-cast concrete blocks may not be the safest kind of housing enclosure of deadly nuclear fuel.”**
- Poured concrete obviously could add to the safety of the cask design.
 - ACE requests that for Limerick Nuclear Power Plant casks that NRC reject the NUHOMS current module of pre-cast concrete blocks which aren’t even anchored to the concrete floor and that NRC require instead poured concrete with the requirement that it is attached to the concrete floor.

10. The nuclear engineer states, *"Industry scuttlebutt suggests NUHOMS concrete enclosure falls apart and the container is breached under a Boeing airplane strike."*

- This issue is a glaring omission in your May 24 letter of concerns.
- Is NRC aware of the potential for concrete enclosures to fall apart under a Boeing airplane strike?
- Is there a report on this? It has been suggested that NRC is unwilling to publish such a report to prevent panic. Has NRC withheld the report to "prevent panic" in communities where NUHOMS have been installed?
- ACE rejects the notion that NUHOMS concrete should be permitted to be used at Limerick just to prevent panic elsewhere. The public needs and deserve the truth and accountability from NRC, the agency paid with public tax dollars to protect the public. To continue to further jeopardize communities just to prevent panic is unacceptable.
- Unless NRC rejects the kind of cement used in NUHOMS designs for Limerick as a precautionary measure, ACE intends to request a full scale GAO investigation into NRC and this issue.

11. The nuclear engineer stated, *"This camouflaged nuclear waste (in casks) is engineered to collapse on its own due to corrosion. NUHOMS may be a sitting duck in the face of a crashing aircraft."*

- In a post 9/11 world NRC should be proceeding with cask oversight using every precaution in every decision, particularly those having to do with crashing aircraft.
- This is especially true at Limerick Nuclear Power Plant. There are two airports operating within five miles of that nuclear plant.
- The Limerick Airport is only about 1 mile away from the Limerick Nuclear Plant. Recently, a drunken pilot flying in and out of that airport put a real scare into everyone. It puts into perspective the real potential for an accidental disaster from a plane flying into an above ground cask. We believe even a small plane could potentially cause a disaster in the current proposed cask design at Limerick Nuclear Power Plant.
- Another long time pilot stated, "if a pilot decides to fly into something there is no way to stop that." Why would NRC continue to allow the Limerick Airport, only about 1 mile from the nuclear plant, to operate when these casks are built and filled? ACE is calling for the Limerick Airport to be closed as long as there are filled casks at Limerick Nuclear Power Plant. Why permit such an unnecessary threat?
- The region around Limerick is one of the most densely populated areas around a nuclear power plant. We believe Limerick is a prime target for terrorists, with above ground casks increasing that threat, making it an easier target for small planes as well as anti-tank missiles or other special weaponry.
- All the more reason for NRC to require the safest, most protective technology for casks used at the Limerick Nuclear Power Plant, whether they are made by Transnuclear or some other cask company.

ACE Is Urging NRC To Seriously Consider ACE Recommendations For Improvement To The Cask Design At Limerick And To Include All Recommended Safeguards. Protect The Public's Interests And Hold Exelon Accountable To Provide The Safest Design To Store Its Deadly Radioactive Wastes.

The Alliance For A Clean Environment (610) 326-6433
June 7, 2006

Whistleblower documents showing failure of the cask quality assurance program.

- 1. Exelon Failed To Address Many Quality Assurance Violations and related problems with casks, identified by Exelon whistle blower, Oscar Shirani.**
- 2. A letter from an NRC employee supports issues raised by the Exelon whistle blower.**

While this is not the cask design proposed for Limerick's casks, the issue goes to integrity and willingness by the company to cut corners on this deadly long term threat and NRC's failure to take appropriate action to protect the public's interests.

Exelon Whistle Blower On Cask Quality Assurance Violations and Related Cask Problems

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Summary of Oscar Shirani's Allegations of Quality Assurance Violations Against Holtec Storage/Transport Casks.

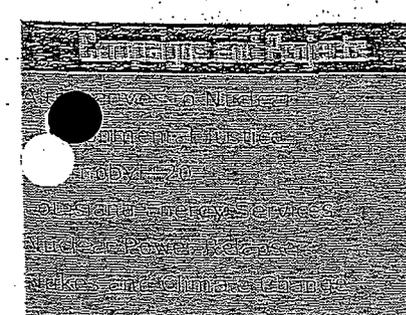
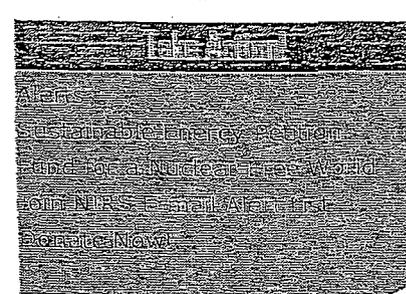
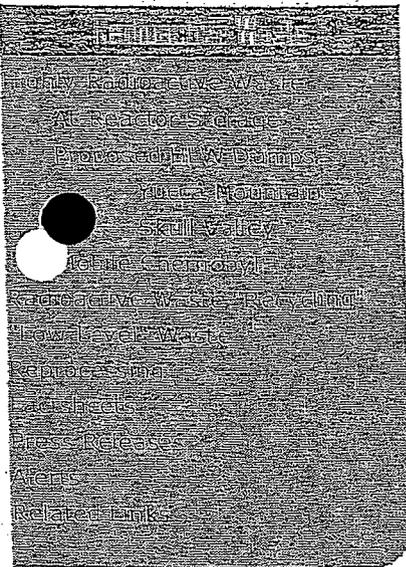
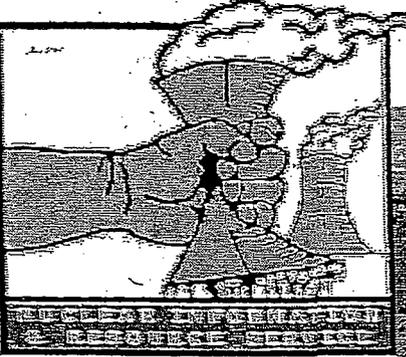
Holtec storage/transport casks are the first dual purpose container for irradiated nuclear fuel certified by the U.S. Nuclear Regulatory Commission (NRC). According to Holtec International's website (<http://www.holteciinternational.com>), Holtec casks are already deployed at 33 U.S. nuclear power plants. Up to 4,000 rail-sized Holtec storage/transport casks would also be used at the proposed Private Fuel Storage interim storage facility in Utah. Given the U.S. Department of Energy's (DOE) recent decision to use "mostly rail" transport to the proposed Yucca Mountain repository, Holtec casks could very well become among the most used shipping containers for highly radioactive waste.

Exelon, the largest nuclear utility in U.S., uses Holtec casks for irradiated fuel storage at its reactor sites. In 1999 and 2000, Oscar Shirani, as a lead quality assurance (QA) auditor for Exelon, identified numerous "major design and fabrication issues" during a QA inspection of Holtec International (the cask designer), Omni Fabrication, and U.S. Tool & Die (the subcontractors responsible for manufacturing the casks). In fact, he identified a "major breakdown" in the QA program itself. The problems were so severe that Shirani sought a Stop Work Order against the manufacturer of the casks until the problems were addressed. Instead, he was run out of Exelon. According to Shirani, these design and manufacturing flaws mean that the structural integrity of the Holtec casks is indeterminate and unreliable, especially under heat-related stress such as during a severe transportation accident.

Although NRC has dismissed Shirani's concerns, NRC Region III (Chicago office) dry cask inspector Ross Landsman refused to sign and approve the NRC's resolution of Shirani's concerns, concluding that this same kind of thinking led to NASA's Space Shuttle disasters.[1] He stated in September 2003, "Holtec, as far as I'm concerned, has a non-effective QA program, and U.S. Tool & Die has no QA program whatsoever." [2] Landsman added that NRC's Nuclear Reactor Regulation division did a poor follow-up on the significant issues identified, and pre-maturely closed them.

Shirani alleges that all existing Holtec casks, some of which are already loaded with highly radioactive waste, as well as the casks under construction now, still flagrantly violate engineering codes (such as those of the American Society of Mechanical Engineers [ASME] and American National Standards Institute [ANSI]), as well as NRC regulations. He concludes that the Holtec casks are "nothing but garbage cans" if they are not made in accordance with government specifications.[3]

Specific examples of the QA violations and related problems alleged by Shirani include:



and risk tearing and cracking of the unevenly cooling welds and metal, in order to meet production goals. Welds on the casks were also performed by unqualified welders. Even NRC has acknowledged that "weld quality records are not in agreement with the code requirements." [4]

- Inadequate controls on the quality of materials used in the manufacturing process, risking brittleness and weakness in the casks.
- Holtec's failure to report holes in neutron shielding material (neutrons are especially hazardous emissions from highly radioactive waste).
- US Tool & Die's failure to use coupon (a small physical sample of metal) testing, and Post Weld Heat Treatment on a regular basis, as required by ASME code and in violation of the codes that were part of the license agreement with NRC.
- Holtec and U.S. Tool & Die quality control inspectors' bypass of hundreds of non-conforming conditions, departures from the original design during cask manufacture. The departures from the original design amount to design changes that require revised analysis to guarantee that manufactured casks actually live up to the structural integrity of the original design. The fact that this revised analysis was never done is in violation of ASME and ANSI codes, and thus NRC regulations, and means the actual manufactured casks' structural integrity is questionable, according to Shirani.
- Holtec's consent to allow U.S. Tool & Die to make design decisions and changes, despite the fact that U.S. Tool & Die does not have design control capability under its QA program.
- Failure to conduct a "root cause investigation" of Holtec's QA program, even though root causes are the main reason for repeated deficiencies.
- Exelon's obstruction of Shirani from performing any follow-up of the audit to confirm that problems had been solved, despite knowing that the fabrication issues identified would have a detrimental impact on the design.
- Exelon's falsified quality-assurance documents and the misleading of the NRC investigation, stating that Shirani's allegations of QA violations were resolved when in fact they were not.
- Lack of understanding in the NRC of the design control process and Holtec's QA program, relating to flaws in welding, design, manufacturing, and materials procurement control. NRC lacks a corrective action mechanism for repeated findings. Shirani alleges his audit findings embarrassed NRC because it had also audited the Holtec casks just a few months previously but found no problems whatsoever.

Shirani concludes that these numerous design and manufacturing flaws call into question the structural integrity of the Holtec casks, especially under heat-related stress such as during severe transportation accidents. He also warns that his eight-day audit showed him only a snap shot of problems, and that there could in fact be additional ones yet to be identified.

[1] Elizabeth Brackett, "Nuclear Controversy," "Chicago Tonight," WTTW Channel 11 Television, Chicago, Illinois, January 29, 2004.

[2] J.A. Savage, "Whistleblower Alleges PG&E Proposed Dry Casks Slipshod," California Energy Circuit, Vol. 1, No. 1, Berkeley, California, September 5, 2003.

[3] *Ibid.*

[4] April 2002 NRC review panel memo, cited in J.A. Savage, "Whistleblower Alleges PG&E Proposed Dry Casks Slipshod," California Energy Circuit, Vol. 1, No. 1, Berkeley, California, September 5, 2003.

* This summary was prepared by Kevin Kamps (202-328-0002 ext. 14; kevin@nirs.org), Nuclear Waste Specialist at Nuclear Information and Resource Service in Washington, D.C. July 22, 2004.



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION III
 201 WAREHOUSE ROAD
 WASHINGTON, DC 20545

January 17, 2001

MEMORANDUM TO: Bruce L. Jorgensen, Chief, Decommissioning Branch
 FROM: Ross Landsman, Decommissioning Branch
 SUBJECT: ATTENDANCE AT HOLTEC USERS GROUP MEETING

R. Landsman

In my quest to become as familiar as I can with the cask world, I attended the Holtec Users Group Meeting in November 2000. During the meeting, I became aware of the following issues.

- Plant Hatch, while loading a Hi-Star Cask, dropped a tie-wrap into the cask. Instead of suspending loading until an analysis (a 72.48) could be performed, they continued to load, and proceeded to weld the lid on the cask. When questioned, Hatch stated that they were taking a chance that they would have to remove the lid. They saw nothing wrong with putting schedule ahead of quality. This is not a very conservative approach and should be stopped. This would never be allowed in Region III. During loading at Point Beach, when they thought that they might have dropped (but did not actually drop) a rubber washer into the cask, they stopped to make sure all the Ts were dotted and the Ts were crossed.
- Susquehanna blows hot air into their cask after draindown and before vacuum drying to pre-remove moisture to shorten the vacuuming time. Several other utility fuel people jumped up and indicated that this should not be done because of fuel cladding damage that might occur. Zirconium cladding does not get along with heated oxygen; it oxidized and degrades. Dresden was going to use hot air to try to pre-dry the cask because of all the trouble they had with vacuum drying, but when they heard all the arguments against, they switched to nitrogen. Susquehanna should be stopped, and what about the existing fuel that's already been oxidized in casks?
- During discussions, a Comed QA auditor indicated that U.S. Tool & Die (the fabricator of the Holtec casks) appears to have a broken corrective action system. Just received a copy of the audit and discovered that the corrective action system wasn't the worst thing broken.

Regarding the corrective action system, the auditors had a finding early in the audit that was closed because of promised corrective actions in a licensee CAR (the document that the licensee uses to address findings.) When similar noncompliances were identified after the licensee dispositioned the CAR, a new finding was open. This issue involves bypassing witness hold points during fabrication which the CAR identified as "isolated" with no further action. The new noncompliances are indicative that the corrective action system is broken and needs fixing which Comed says they can't push because of a schedule.

ALL

B. Copenhagen

The issue more troubling is in the area of special processes, i.e., welding. The audit identified issues such as:

1. Verification requirements and documentation for Welding Procedure Specifications (WPS) is not being performed and not documented in the traveler (PWSP).
2. The supporting PCR's do not qualify welding without a subsequent PWHT.
3. WPSs need the proper qualification (after-the-fact).
4. NCRs permitted "welding-at-risk" without a qualified and approved WPS.
5. Inadequate information/documentation exists to determine whether or not welders have welded beyond their qualified thickness range.
6. The information in the Data Sheets recorded by the welders is out-of-sequence.
7. The Data Sheets do not reference the NCRs, Rework, Repairs, etc. making it extremely difficult to recreate the work activities.
8. Data Sheets for Hatch Unit 2 indicate the use of E81T1-N11 for a seal weld. UST&D cannot determine what this weld was.
9. Verification that the 308 did not encroach upon the carbon steel surface of the overpack is not done to provide assurance that 308 did not contact carbon steel.
10. UST&D knowingly performed welding without an approved procedure and used the NCR process for fabrication activities driven by schedule.
11. The existing system of documentation is ineffective in maintaining an accurate work history and the welders have filled out the documentation incorrectly.

Furthermore, words exist in the audit such as:

1. "needs enormous improvement in the areas of welding and corrective action program to implement its QA program."
2. "They have used the NCR process where it is not intended to be used, i.e., performing welding 'at risk'. They knowingly do welding without an approved procedure, violating both ASME and their own QA manual."
3. "The NCR process is used when..."

B. Jorgensen

The audit was done in June/July, 2000, and still the issues are not resolved. Worse yet, I just discovered that the Audit Team Leader is being moved sideways on site, out of the audit group. These findings will be dropped.

The audit stated that the NRC performed a paper audit in August 1999, and determined that the QA program meets regulatory requirements which was continuously thrown up in the auditor's face. This audit indicates that in no way do they meet our RIII requirements in implementation of the program. Cost and scheduling are controlling the work. This was illustrated by the quality of the first cask received at Dresden which had to have all the sealing surfaces re-machined on site. I did not look at the cask material or fabrication records to determine if the cask was manufactured correctly. I assumed, incorrectly, that the cask was constructed OK. If this was back in the old construction days, we would already have had issued a stop work order. These same fabrication issues are what got the original cask manufacturers in trouble and caused them to go under.

I think these findings alone justify going to owner's group meetings. They are not marketing meetings as Susan states. They are fact finding meetings, lessons learned to be used at our other cask sites. I also plan to attend the VSC-24 owners' group meeting this spring.

SHIRAN'S NOTES

1. This letter was sent 2 days after OSCAR SHIRANI WAS REMOVED FROM NUCLEAR DEPT. TO Finance group. (Jan 15 2001)

- whereas the NRC's Response to this letter is Nowhere. NRC ignored Dr. Landsman's letter.

2. ← THIS DOCUMENT SHOWS THAT THE OFFICE OF INSPECTOR GENERAL (OIG)'S INVESTIGATION WAS A LIE AND SHAM THAT SHIRANI NOTIFIED THE NRC IN OCTOBER 2001, ONE MONTH PRIOR TO HIS TERMINATION. NRC KNEW THAT EXELON HAD REMOVED SHIRANI FROM ITS NUCLEAR DEPARTMENT 8 MONTHS PRIOR TO SHIRANI'S TERMINATION ON OCTOBER 2001. EXELON JUST Clocked SHIRANI OUT OF THE NUCLEAR IN DECEMBER 2000 TO GET RID OF HIM AFTER 180 DAYS OF HIS WHISTLE BLOWER'S PROTECTION WINDOW EXPIRED FROM ITS FINANCE DEPARTMENT WHICH IS NOT A

(Part of NRC)

Dry Cask Accidents and Incidents

CRACKS, CORROSION, and EXPLOSION

Serious Problems With Other Cask Companies

Sierra Nuclear Corporation, now British Nuclear Fuels Cask design certified by NRC in 1993

1996 Explosion in Wisconsin jolted public confidence in the dry cask storage program.

- A welding torch ignited pent up hydrogen gas with enough force to dislodge the cask's lid.

An explosion was caused by an electro-chemical reaction between an anti-corrosion zinc liner with the cask and the borated "spent" fuel pool water.

- Employees observed bubbles in "spent fuel pools" during loading of dry casks, yet failed to understand that they were flammable hydrogen gas and did not report them to NRC – it was shrugged off by employees as excess cleaning solvents.
- NRC inspection of SNC's cask manufacturing facility revealed confusion, inadequate testing, and poor quality control.

In 1999, again there were 2 separate "hydrogen ignition incidents" or "burns" not reported to NRC for days.

- NRC did not cite the company for any violations even though:
 - ✓ Irradiated fuel involved in the "burns" had cooled for less than 5 years in the fuel pool
 - ✓ Loading it in dry casks was in violation of the casks' technical design
 - ✓ Critics charged that the "mistake" was intentional - failure to cool adequate time was intentional
 - ✓ Records were destroyed in a mysterious fire – fire inspectors never ruled out arson

2000 - Cask Loading Incident In Oregon

So many hydrogen bubbles in fuel pool – work was suspended.

British Nuclear Fuels was cited for Poor Quality Control and Assurance in Cask Manufacturing and Maintenance – in 4 years neither NRC nor BNF corrected the problem.

CRACKING in WELDS

Weld failure in shield lids was unanticipated and unanalyzed by industry and NRC.

1997 – Delayed cracking in welds supposed to seal shut multiple shield lids on casks – Point Beach and Arkansas One nuclear plants.

- Cracks can cause irradiated fuel assemblies to become vulnerable to contact with air, oxidation, and deterioration.
- Such degradation could lead to serious irradiated fuel handling and transportation problems in the future.

NUHOMS casks, manufactured by VECTRA, now owned by Transnuclear, subsidiary of COGEMA

- Aggregate used to fabricate casks' outer concrete shells was poor quality, and the shells themselves were ground too thin.
- Built below technical specifications.

January, 2000, casks by Transnuclear at Surry nuclear facility in Virginia developed 6" long cracks in its outer concrete shield, loose bolts, and a helium leak.

May, 2000, Flaw with neutron shielding material used by Holtec.

April, 2001, Sacramento – Unexpected mishap – faulty O-ring leaked air underwater in the irradiated fuel storage pool during loading operations, threatening to contaminate the fuel-holding inner canister with radioactive pool water.

- September, 2001 – Exelon spokesperson admitted the NRC granted Dresden an exemption when its recently, poorly poured dry cask storage concrete pad did not meet specifications.

CASKS MAKE INVITING TERRORIST TARGETS

High Level Radioactive Wastes Stored Above Ground In Concentrated Rows
At Visible Outside Locations Add Significant Targets For Terrorists At Nuclear Plants.

Evidence Shows

Casks Can Be Penetrated With Missiles From 2 Miles Away

Army Testing Proves One Of the Safest Casks Was Penetrated By A Missile

But, the nuclear industry claims: *"On-site high-level radioactive waste storage casks at nuclear power plants are not vulnerable to terrorist attack even by aircraft."*

1998 U.S. Army Weapons Test Shows:

CASKS ARE VULNERABLE TO TERRORIST ATTACKS

A Missile Blasted A Hole Completely Through A Cask Wall - Proven by video

Armor Piercing Missile Perforated High-Level Radioactive Waste Storage Cask

- ✓ Missile – 5" in diameter, less than 4' long, weight less than 50 pounds
- ✓ Launched from a portable tripod launcher with range of nearly 2 miles
- ✓ The missile, TOW, which penetrated the cask wall, is the most widely distributed missile in service around the world, including the U.S. and 36 other countries.
- ✓ Iran may have obtained 1,750 or more TOW missiles, according to Military Analysis Network.

Facts About The Cask Design That Was Penetrated With A Missile

- The type cask that was pierced was a dual-purpose, CASTOR cast-iron cask used for dry-storage and transport. CASTOR casks have forged iron walls 15" thick.
- CASTOR is among the most robust of various models of nuclear waste storage casks in existence, and licensed by NRC. Other U.S. dry cask models (having walls of only a few to several inches of steel) are much less robust than the CASTOR design that was pierced by the missile in this testing.
- Rail-car sized casks like the CASTOR can hold over 200 times the long-lasting radioactivity released by the Hiroshima atomic bomb.
- If irradiated nuclear fuel had been inside, a disastrous release of radioactive particles and gases could have occurred.
- A terrorist attack on a dry storage cask – combining a missile to ventilate a cask with a launched weapon could release large quantities of deadly radioactivity.
- The GAPING HOLE (shown in the video) would also breach radiation-shielding, exposing any closely approaching emergency responders, such as fire fighters, to FATAL RADIATION DOSES IN MINUTES.
- Casks were originally designed as radiation shielding, NOT as a "flak jacket" while storing high-level radioactive waste at nuclear power plants. 600 of these casks are already in use worldwide, including in Virginia.
- **ACE suggests extra protection by fortifying cask storage at Limerick, dispersing and bunkering dry storage casks behind extra thick concrete, steel, and earthen shields to defend against attacks by high explosives or missiles.**

KVBC TV In Las Vegas, Nevada Investigative Report Shows:

- **CASKS For Storing High-Level Radioactive Wastes Can Be Broken Open By Fire** - A test at Sandia Labs in New Mexico show casks to be a failure in fire – After only 100 minutes in fire the cask broke open.
- **Tests on Casks Were Never Designed To Prove Safety** - People at Sandia Labs are not saying the casks are safe. In fact, one test proved a clear failure against terrorist attack. It was possible to penetrate a cask, and the hole in the cask is proof.

NO SAFE CASK UNLOADING PROCEDURE EXISTS

INCREDIBLE! Once loaded, casks can't be safely unloaded.
It is beyond irresponsible to keep storing high-level radioactive wastes
in casks that cannot be safely unloaded to reduce serious risks.

If in the not too unlikely scenario that the casks would malfunction, or the waste were to leak, or a repository were to open that could accept the wastes, it remains unclear whether dry casks could be safely unloaded back into fuel storage pools or into transport casks for shipment off-site.

- 1993, Michigan filed an injunction in federal court against loading the casks at Palisades, alleging that there was no proven safe method for unloading the casks.
- 1994, Consumers Energy discovered its 4th load BSC-24 dry cask had weld flaws. Consumers announced it would unload the irradiated fuel in the cask back into the storage pool. 10 years after they announced this, the defective cask sits fully loaded on the shoreline of Lake Michigan.
 - A. Reintroducing the 400 degree Fahrenheit fuel assemblies back into the 100 degree fuel pool water would result in a radioactive steam flash hazardous to workers, and would thermally shock the fuel assemblies threatening to further degrade them.
 - B. The welded-shut inner canister would have to be cut open in a timeframe of less than 50 hours, for the cooling process to be maintained during unloading – the fuel would begin to overheat.
 - C. There was NO procedure yet developed to remove steel shims that were pressure fit inside the cask lid.
 - D. Corrosion between the metallic inner canister and the metallic lining of the outer shell of VSC-24's could cause a bonding together that would be very difficult to pry apart.**In spite of all this, Consumers rushed to load more VSC-24 casks – there were no penalties or attempts to correct the serious problems and threats.**

Worker and Public Safety **During Cask Handling And Cask Moving Activities**

Human error and equipment failure raise issues of worker and public safety during cask handling and moving activities.

- An explosion took place above 24 irradiated fuel assemblies already loaded into the casks, containing the equivalent amount of long-lasting radioactive released by 240 Hiroshima-sized atomic bombs: **The forceful explosion took place near the plant's "spent" fuel pool, not a place to "play with fire" or make mistakes with objects weighing many tons.**
- Dropping either a loaded or unloaded cask inside the fuel pool building can severely damage plant safety equipment, jeopardizing reactor operation and the cooling of irradiated fuel in the storage pond.
- May, 1995, a loaded cask became stuck in the hoisted position above the Prairie Island, Minnesota plant's irradiated fuel storage pool for 16 hours. There was a risk of dropping back into the pool, damaging irradiated fuel stored there, or punching a hole in the pool leading to a loss of coolant accident and potentially catastrophic consequences.

Boiling water reactors such as Limerick place irradiated fuel storage pools several stories up in the reactor building. Cask movement can place heavy loads up to ten stories high inside the reactor building. A cask drop would send the heavy load crashing down through several floors of the building which house vital safety systems, with untold consequences.

HIGH LEVEL NUCLEAR WASTE PRESENTS A REAL DILEMMA

PEOPLE WHO LIVE AROUND NUCLEAR POWER PLANTS WILL BE EXPOSED TO POISONS THAT REMAIN DEADLY FOR HUNDREDS OF THOUSANDS OF YEARS

➤ **YET, THERE IS NO REAL OPPORTUNITY FOR SAFEGUARDS THROUGH PUBLIC INVOLVEMENT.**

A Retreat From Regulation - Limerick's Permit for Dry Cask Storage will be issued under a "generic licensing process" using the first license issued in Michigan, 1993.

- NRC can approve Independent Spent Fuel Storage Installations such as this one at Limerick without rigorous investigation, relying on a nuclear plant's general operating license, now over 20 years old for Limerick.
 - ✓ Limerick's license was issued decades ago before Spent Fuel Storage Installations were even envisioned.
- Nominal safeguards for protecting the environment and involving the public – normally required for licensing a nuclear facility are done away with:
 1. No Site Specific Study is Required.
 2. No Environmental Impact Study is Required.
 3. No Adjudicatory Public Hearing Process is Allowed.
 4. NRC Rubberstamps Independent Spent Fuel Storage Installations automatically. NRC always finds no adverse impacts on the environment, regardless of the circumstances, and based upon an outdated Environmental Impact Study.

Example: Why Outdated Studies Should Not Be Used To Issue Current Permits
1982 CRAC 2 Report

Calculating Nuclear Reactor Accident Consequences For Limerick Nuclear Power Plant, Presented to Congress, 1982 (Citation for the report is NUREG/CR-2239, SAND81-1549). Commissioned by the NRC, Conducted by Sandia National Laboratories, Albuquerque New Mexico, operated by U.S. Energy Department.

1980 Numbers Calculated for Limerick Nuclear Power Plant, Reported to Congress in the 1982 CRAC 2 Report, if an accident occurred at either of the two reactors in Limerick.

NUMBERS WOULD BE FAR HIGHER NOW – 25 YEARS LATER:

- 74,000 Early Fatalities
- 610,000 Early Injuries (most of any U.S. reactor)
- 34,000 Cancer Deaths

1982 CRAC Report also calculates costs from an accident, in 1980 dollars:

- Limerick 1 estimated costs could reach \$213 billion
- Limerick 2 estimated costs could reach \$197 billion.

Inflation since 1980 means these numbers would be far higher today.

In the event of an accident or terrorist attack far more people would be harmed 25 years later. Yet the public has no real opportunity to say NO to above ground high-level radioactive storage at Limerick. Limerick's dry cask radioactive waste storage should not be permitted to increase threats, yet there seems to be no choice that is safe to people or the environment.

- If there were another option for this high risk storage of long-lived deadly and dangerous high-level radioactive waste in Limerick Casks should never be permitted.
- Any facility that makes waste which presents this much of a threat should never have been opened and should be shut down now. Why do we continue to make waste we can't dispose of safely?

Detailed Review and Analysis Of:
NRC's June 16, 2006 Letter In Response
To ACE's April 21 Requests For Written Responses:

RE: High Level Radioactive Waste Storage At Limerick Nuclear Power Plant

Cause For Concern

NRC Failed to Address Two Major Concerns

1. NRC refuses to address or improve security against vulnerabilities of air strikes and missiles against terrorist attacks, apparently in order to save the nuclear industry bad PR and monetary costs – but at what risk to the surrounding public and environment? NRC's failed to address Army testing proving a missile can penetrate the most robust cask design (far more robust than the ones proposed for Limerick).

- Anti-tank weapons (the TOW anti-tank missile), used at the 1998 Aberdeen Proving Ground test in Maryland, blew a grapefruit or softball sized hole through 15 inches of cast iron cask wall. A second TOW, or another explosive or incendiary device, lodged in that hole could then cause the severe fire that could release catastrophic amounts of radiation into the flames, smoke, and air, to blow downwind.

- Shaped charges, as they are called, could also be used by terrorist attackers; they are designed to penetrate 30 inches of steel; the NUHOMS casks are nowhere near that thick.
- High explosives could also breach such containers.
- Combined with a long-duration, high-temperature fire, which attackers could also cause in conjunction with the explosive breach of the container, a catastrophic radiation release could unfold.

2. NRC failed to respond to specific concerns from a nuclear engineer, regarding specific design flaws of the NUHOMS casks proposed for Limerick. This community needs and deserves an independent review and assurances against failure, concerning each specific potential design flaw identified by the nuclear engineer (including the potential for corrosion and faulty concrete), BEFORE casks are built and filled with deadly radioactive waste in Limerick.

NRC Comments from their 6/16/06 Letter to ACE and Our Responses:
(ACE responses are based on verified facts from our research and those provided by national experts.)

NRC reminded us cask technology has been used by the nuclear industry for 20 years.

ACE Response:

- The nuclear industry had a bleak history of accidents and incidents in that short time. A NIRS fact sheet chronicles events that show a lot has gone wrong in just 20 years.
- Clearly, 20 years is not time enough to know long term consequences and problems with casks. Limerick's radioactive waste will remain deadly for tens of thousands of years and outlive any container it is placed in now.

Most Concerning – NRC's 6/16/06 letter identifies NRC's attempt to downplay even its own earlier lowball estimates of risks:

NRC reexamined predicted behavior of spent fuel stored in pools during accident scenarios and determined:

- Irradiated fuel is more easily cooled than predicted in earlier studies
- Accident consequences would be far less severe than previously estimated
- Radioactive release would be much smaller (by a factor of 10) and radioactive release would begin later than estimated thereby resulting in:
 - More time to implement effective protective measures
 - Reduced health effects
 - Reduced land contamination

ACE Response:

- **NRC's ASSUMPTIONS are not based in reality. There is NO INDEPENDENT hard science to prove NRC's claims which need INDEPENDENT REVIEW. NRC's reexamined ASSUMPTIONS are in direct opposition to the facts as well as logic. This attempt to deceive the public on such a critical issues is shameful!**

- NRC's assumptions fail to regulate the industry or protect the public.
- NRC's time and resources should NOT be spent downplaying obvious risks by re-running calculations to produce new assumptions of safety.
- NRC attempts to provide cover and hide the truth about obvious nuclear industry high level radioactive waste threats to public health and safety.

Example: An NRC brochure obtained by ACE in Limerick states that 10 years after removal from the reactor, the radiation dose 1 meter away exceeds 10,000 REMS per hour. A dose of 5,000 rems would be expected to cause immediate incapacitation and death within one week. It is beyond irresponsible for NRC to make "claims about PREDICTED behavior" reductions of accident consequences or radiation releases.

GLARING NRC CONTRADICTION IN REQUIRED COOLING TIME:

For years, as well as 7/13/06 at the meeting in Limerick, NRC acknowledged it would take at least 5 years before rods are cooled off enough in fuel pools to safely remove them for dry cask storage.

- **Yet, in the 6/16/06 letter to ACE, NRC stated "irradiated fuel is more easily cooled than predicted."**
- **NRC stated 6/16/06 "Dry cask storage allows spent fuel already cooled in the spent fuel pool for at least one year to be placed inside a container."**
- **When confronted by ACE about the shocking contradiction between the NRC statement made in our 6/16/06 letter claiming 1 year was enough to cool, and then NRC again stating at the 7/13/06 meeting in Limerick that 5 years of cooling was required, NRC claimed that night that there was a mistake in the 6/16 NRC letter to ACE.**
- **Leaving the 7/13 meeting, NRC's James Trapp told Donna Cuthbert the one year claim in our letter had to be a mistake and NRC would send a correction. He admitted he worked on the letter but had no recollection of the 1 year mistake. He promised to send ACE a corrected letter.**

➤ 7/25/06 NRC's James Trappe sent an e-mail clarification to ACE stating, "In our letter to you dated June 16, 2006 we stated the time was at least 1 year. This statement was correct. I received the following information from Randy Hall.

- "Regulations specify spent fuel must be cooled ...at least one year before placed in dry storage."
- "However, in practice, most spent fuel placed in dry storage must be aged for 5 years or more, as required by all NRC-approved Certificates of Compliance for dry cask storage systems, and NRC issued site-specific licenses."
- "There are cask designs, including NUHOMS [used for Limerick] that would allow certain low-irradiated fuel to be placed in a cask with only 3 or more years of cooling in the pool."

The lack of clarity, even within NRC, concerning the requirement for cooling this deadly radioactive waste is nothing less than astounding. This is a perfect example of NRC's attempt to accommodate the nuclear industry. NRC is willing to compromise public safety to accommodate nuclear power plant operators. Since Limerick is using NUHOMS casks and radioactive rods will be permitted to be removed as early as 3 years after cooling, this issue must be fully investigated by an independent source based on the following:

- ✓ Intense heat can damage fuel rods, making future handling and transport all that much more hazardous and future leakage all that much more likely.
- ✓ Intense heat can damage the casks themselves, making radioactive release more likely down the road, as the casks deteriorate with time, but also with the heat damage on the materials, the concrete and steel in the casks.

Supporting Facts For Concern:

- There is risk of fuel rods overheating; due to high radioactive decay heat - thermal heat from the decay of radioactive elements in the waste.
 - a. The heat means the fuel itself could overheat in dry cask storage, and could also damage the dry cask structure.
 - b. The radioactivity means that radiation levels coming off the transfer casks during loading, and even off the dry cask itself, would be higher, endangering workers especially.
- Since March 27, 2006, Exelon claimed spent fuel rods had to remain in spent fuel pools at least 5 years before placing them in casks.
- At one nuclear plant where the fuel was removed prior to 5 years, there were unnecessary and avoidable risks, as described above. Because Palisades loaded less-than-five-years-cooled fuel into its dry casks, in violation of the tech specs on those dry casks, they risked damaging the fuel and the casks, with all the attendants near, and long-term risks such damage means.
- It's not only the immediate disasters we need to worry about, but also the long term integrity of the containers and the irradiated fuel itself.

Hotter and Higher Levels of Radioactive Fuel Makes For More Risk All Around.

We are doubtful that NRC dose rates could be met while transferring and storing in dry casks fuel that is less than 5 years cooled in the pool.

CLEARLY, THIS ENTIRE MATTER NEEDS A CAREFUL INDEPENDENT INVESTIGATION!

Security

NRC's response proved that Limerick Nuclear Power Plant is NOT well protected against air strikes or missiles.

ACE Response:

- Air strikes and missile strikes against high-level radioactive waste storage in above ground casks could be devastating, yet NRC has used deceptive arguments and spin to minimize that threat, apparently in order to save the nuclear industry bad PR and monetary costs – but at what risk to the surrounding public and environment?

NRC claims anti-aircraft weapons would present significant command and control challenges, with threatened collateral damage to the surrounding community.

ACE Response:

The long term health, safety, and welfare of this region, would be forever threatened by a disaster at Limerick Nuclear Power Plant, from suicide bombers, missiles, or even air craft accidents, especially now with above ground storage of ever growing amounts of deadly radioactive wastes at Limerick Nuclear Power Plant.

- Instead of requiring improved safeguards NRC (throughout their 6/16/06 responses to ACE), attempted to downplay the potential for harm, as well as the estimates of health and financial costs to the public from a terrorist strike or accident involving deadly radioactive waste.
- What collateral damage would happen if a plane or missile would strike any of the high-level radioactive targets at Limerick Nuclear Power Plant? How many people would get sick and die?
 - Estimates reported to Congress for one reactor in 1982 – over 700,000
- What would be the financial costs of that? Depending on what was hit, perhaps the environment in the entire region would become uninhabitable for decades.
 - Estimates for one reactor in 1982 – over \$200,000 BILLION

NRC even attempted to disclaim their own worst case scenario estimate for Limerick Nuclear Power Plant, from 1980 data, reported to Congress in 1982.

Airport Issues

NRC irresponsibly says let FAA, DOD, and Dept. of Homeland Security worry about it! It isn't our department.

ACE Response:

We believe this should be considered dereliction of duty by NRC!

- Isn't that a failure of NRC to meet its requirements under the Atomic Energy Act, to protect and defend the common welfare and defense?
- Isn't it a failure to fulfill NRC's mission statement of protecting the public health and safety and environment?
- A catastrophic terrorist attack would destroy all those things NRC is supposed to protect.

NRC states "not our department" on several issues for which they should be responsible and clearly should be addressing.

ACE Response:

While NRC refuses to take responsibility, they even refuse to forward our concerns to those agencies to which they defer.

- Instead of answering concerns, NRC referred us to DOE, FAA, and GAO without referring our concerns to those agencies.
- And NRC has refused to forward concerns between NRC departments. At the NRC meeting April 20, 2006 NRC refused to accept in person our written requests for written responses and made us mail them instead.

After 9/11 NRC, FAA, and DOD determined that a Notice to Airmen, strongly urging pilots to not circle or loiter over nuclear plants, was the vehicle to protect the airspace above nuclear plants.

ACE Response:

- A notice to pilots has NO VALUE in preventing a terrorist attack or missile strike. It may help to protect pilots, but will have no effect on terrorists who plan to hit nuclear power plant targets. We can be sure Al Qaeda suicide hijackers would NOT be deterred and/or intimidated if they knew they'd have to be interviewed by law enforcement. They would already be dead.
- There is no plan to protect our region against terrorist attacks on Limerick Nuclear Power Plant by air or missile. NRC is punting to FAA, DOD, and Department of Homeland Security. "Not our department" is NRC's official position on the threat of hijacked airliners being crashed into nuclear power plants. Very scary, especially when the 9/11 Commission confirmed that the 9/11 attacks originally targeted nuclear plants and that this could happen again in the future.

NRC stated *"selecting a cask that can only be used for storage at this point is also an acceptable option for a company."*

ACE Response:

- If casks used only for storage are allowed to be selected by the nuclear industry, this shows that dry cask storage at nuclear power plants is not the temporary storage as was first suggested, but the final resting place for this deadly waste forever.
- Evidence suggests that the casks built for Limerick will remain there forever, so we better get the best plan possible.
 - The first cupful of high level waste, generated in 1942 in the first chain reaction, has yet to be dealt with permanently – it too is in "interim" storage, which tells us everything we need to know... Indefinite, long term storage is likely forever.
 - Some reactors have been sitting with wastes on site since the 1950s and 1960s! Pools may have been emptied into dry cask storage, but wastes remain on site.
 - There is no safe other place for the wastes to go anywhere in the nation.
- Surry, VA has been sitting on wastes in dry casks for over 20 years.
- The industry got away with using storage only casks at Palisades in 1993.
 - They deceptively claimed unloading casks would be easy – just reverse the loading procedure.
 - But when the 4th cask to be loaded was found to have welding defects, the company ran into technical difficulties unloading it, and chose to just leave it sitting there, fully loaded.
 - It sat there for 12 years, at this point.
 - It will be difficult, perhaps impossible, to safely unload those palisades casks.

NRC states *"the 1st .. installation was in 1986 at Surry .. in Virginia. Limerick is planning to use NUHOMS by Transnuclear."*

ACE Response:

- ACE questioned cask problems at Surry with these very casks planned for Limerick. NRC failed to provide specific responses. Several NUHOMS problems were identified from the past, not only at Surry, but possibly also at Davis-Besse.

NRC states "casks must meet extremely demanding standards".

ACE Response:

- While this may be true on paper, it is not true in practice. Casks that failed to meet quality assurance standards were given approval by NRC in the past.
- NRC only requires certain design criteria that casks must meet – and on paper only, before they get a license. But these design criteria leave a lot to be desired.
- The fire design criteria is for a 1,475 degree Fahrenheit fire that burns for 30 minutes. A severe accident or a terrorist attack could generate a fire that burns considerably hotter, and for a longer time, than that. Then what?
 - NRC and industry do not know how long NUHOMS casks would last in a fire hotter than 1,475 degrees that burns for longer than 30 minutes.
 - NRC refuses to "test to destruction" – they don't want to show that these containers CAN fail. They'd rather keep that fact cloudy.
 - Perhaps they could last 30 minutes in a 1,475 degree fire – although they've only showed that by computer simulation, and scale model, and on paper – they've not showed it with actual full-scale physical safety tests, as those are not required.

NRC makes a deceptive, if not false, argument stating, *"The design of casks would make a [radioactive] release extremely unlikely. If terrorists succeeded in striking a cask with an explosive and the cask were breached, the terrorists would have to get the radioactive material out of the container and disperse it into the environment"*

ACE Response:

- As stated above...What about anti-tank weapons, such as the TOW anti-tank missile used at the 1998 Aberdeen Proving Ground test in Maryland that blew a grapefruit or softball sized hole clean through 15 inches of cast iron cask wall.
- A second TOW, or another explosive or incendiary device, lodged in that hole could then cause the severe fire that could lodge catastrophic amounts of radiation into the flames, smoke, and air, to blow downwind.
 - Frighteningly, many hundreds of TOW missiles have been bought and sold on the black market over the past few decades.
- Shaped charges, as they are called, could also be used by terrorist attackers; they are designed to penetrate 30 inches of steel; the NUHOMS casks are nowhere near that thick.
- High explosives could also breach such containers. Combined with a long-duration, high-temperature fire, which attackers could also cause in conjunction with the explosive breach of the container, a catastrophic radiation release could unfold.
- NRC refuses to address these vulnerabilities, apparently in order to save the industry bad PR and monetary costs – but at what risk to the surrounding public and environment?

NRC stated under High Level Waste Storage in the 5th paragraph that "Casks must meet extremely demanding standards to ensure their integrity in the most severe conditions, including sabotage."

ACE Response:

- NRC may try to spin it that way, but evidence suggests that statement is false. It is just wrong, and irresponsible to imply that casks were designed with terrorism in mind, when they were not.

- **For an honest answer, perhaps we need to ask directly - Were NRC's design criteria for casks developed with terrorism in mind?**
 - If they claim they were, then the design criteria are woefully inadequate, as shown by the test at Sandia over 25 years ago, and the test at Aberdeen 8 years ago.
- **It appears clear that NRC design criteria were NOT developed with terrorist attack or sabotage in mind.**
 - NRC hired Sandia National Lab to do some testing and analysis of what kind of impact terrorist attacks would have on casks. Although they've tried to spin it otherwise, these tests have shown that a significant radiological release could occur due to such an attack.
 - For example, scientists shot a transport cask with a missile in the late 1970s/early 1980s, at Sandia. The missile breached the shipping container, and cut a burn path through the fuel rods.
 - Had real high level waste been inside, a radiological release would have occurred.
 - NRC and even Sandia tried to downplay the potential release.
 - But if the attack had been followed by multiple missiles and/or incendiary devices, the release would have been worsened substantially.
 - Why would anyone believe Al Qaeda would show up with only one missile?

Cask Quality Assurance

NRC acknowledged that ACE listed a variety of issues [incidents and accidents] that have come up over the years at various dry cask storage installations, yet failed to provide the corrective and/or enforcement action for each, as requested.

ACE Response:

- **NRC failed to address ACE's request for enforcement and corrective actions for each of the accidents and incidents [issues]. NRC not only "claimed" to have inspected the accidents and incidents, but also to have taken corrective actions, "as necessary."**
- **Based on past history, what NRC deems "as necessary" fails to protect the public's interests. NRC failed to take action to force the company to unload this faulty cask. What needs to be done to address and protect the public's interests can be quite different than what NRC deems "necessary".**
- **One example - NRC has allowed a nuclear power plant company to keep a defective cask fully loaded for 12 years now.**

The 4th cask loaded at Palisades was defective. Despite the company promising to unload it, they didn't. NRC did nothing. A perfect example of LAX and irresponsible NRC oversight and failure of enforcement action. How can we trust NRC to decide what casks need to be unloaded "as necessary," when

 - Both the company and NRC perjured themselves in federal court when they assured the judge that the casks could be unloaded simply by reversing the loading procedure.
 - When push came to shove, they could not do that. But then continued to just load more casks after the problem with the 4th one.
 - There are 29 fully loaded casks at Palisades now. Soon to be posted on the NIRS website, documentation of the NRC and company perjuring themselves in court – [www.nirs.org /Palisades](http://www.nirs.org/Palisades) subsection.

- NRC provided information for only one corrective action in 20 years, a pathetic commentary on NRC's corrective and enforcement actions.
 - In 1996 NRC issued a Bulletin to the nuclear industry for action to address chemical reactions in spent fuel storage canisters. This wasn't even a corrective or enforcement action for the specific accident.
 - ✓ Sending an NRC Bulletin to other nuclear power plants is hardly a corrective action for the serious threat which triggered the 1996 bulletin. A bulletin "MAY" have been a preventive action, but it was not a corrective action for the horse that was already out of the barn.
 - The Point Beach nuclear plant in Wisconsin had managed to cause an explosion in a VSC-24 dry cask due to a build up of hydrogen gas, ignited by the welding torch.
 - This happened on the edge of the storage pool.
 - Had that lid fallen into the pool, it could have damaged fuel down below, or even worse, damaged the pool, draining away cooling water, potentially leading to a waste pool fire, which could kill tens of thousands downwind, according to a 2001 NRC report.
 - So first the accidental explosion in May 1996, then the NRC Bulletin. But then, in 1999, having had 3 long years to get its ducks in a row, Palisades managed to ignite built up hydrogen gas in dry casks, despite the bulletin.
 - Two separate crews ignited the hydrogen. The first didn't even tell the second crew to watch out.
 - The NRC had left and gone back to regional headquarters before either crew ignited the hydrogen, convinced that everything was going fine, they weren't needed anymore.
 - There were other related hydrogen gas build up incidents with the VSC-24s – one in the Trojan nuclear plant storage pool. A NIRS fact sheet provides more details (www.nirs.org).
- So much for the efficacy of that 1996 NRC Bulletin, which they called a corrective action! It appears the utilities didn't read that NRC corrective action Bulletin!
 - Ironically, the hydrogen gas build up was due to a high school level chemical reaction between boric acid in the irradiated fuel pool water reacting with the zinc in the anti-corrosion paint liner used on the casks, generating hydrogen gas.
 - That basic reaction was missed by all the "experts" at the cask company, the nuclear utility, and the NRC. That is unacceptable!

There are numerous such problems with dry casks which NRC is just letting slide – as it seems to believe there is nothing utilities can do wrong to cause a serious problem with dry cask storage, as it is so inherently safe.

The Sandia Study

In the first paragraph NRC claims these [conclusions] do not represent what would be expected if a severe accident occurred at a nuclear power plant in this "Siting Criteria Guidance". In the second paragraph NRC claims "*analysis employed an accident scenario orders of magnitude greater than what is believed possible.*"

ACE Response:

- NRC is now attempting to dismiss and discredit its own 1982 worst case accident scenario calculations on 1980 data around Limerick Nuclear Power Plant.

- NRC double talk is attempting to mask the true potential for disaster in the region around Limerick Nuclear Power Plant! NRC can't have it both ways. Either they admit calculations are based on fantasy and they really have no idea how many people will actually die and be harmed, or how much that will cost financially in a worst case scenario around Limerick, or accept their own worst case scenario predictions from 1982.
- Based on the population explosion in the region over the past 26 years, even "if" the accident scenario was orders of magnitude greater, we suggest that has been greatly exceeded by now.
- Radiation released at Chernobyl and from bomb testing has been blamed for high levels of radiation found around the world and even in the soil in our area, yet NRC would like us to believe that radiation released in an accident at Limerick will not travel 30 to 50 miles from the Limerick Nuclear Power Plant.
- Common sense suggests that radiation released from a Limerick Nuclear Power Plant accident or terrorist attack could travel at least 30 miles, and that the calculated physical and financial harms on 1980 data for a worst case scenario are easily feasible.
- Yet, in the 6/16/06 response to ACE, NRC attempts to minimize its own 1982 calculations for a worst case scenario, which evidence suggests would not be far lower as NRC suggests, but instead far higher due to a population explosion around Limerick in the past 26 years, as well as inflation. While the worst case scenario statistics reported in 1982 are shocking, it is conceivable in reality, they would be much worse today.

CRAC-2 Report

Calculating Nuclear Reactor Accident Consequences
For Limerick Nuclear Power Plant

Presented to Congress, 1982

The citation for the report is NUREG/CR-2239, SAND81-1549.

Commissioned by the NRC

Conducted by Sandia National Laboratories

Albuquerque New Mexico, operated by U.S. Energy Department

Numbers Calculated for Limerick Nuclear Power Plant in 1982 If an accident occurred at either of the two reactors in Limerick

- ✓ 74,000 Early Fatalities
- ✓ 610,000 Early Injuries (most of any U.S. reactor)
- ✓ 34,000 Cancer Deaths

CRAC-2 Calculations are probably HIGHLY UNDERESTIMATED, since

- a. the results are based on 1980 population (it has grown sharply since then)
- b. it includes only persons living within 30 miles of the plant (previous accidents show damage goes much further than 30 miles)
- c. it only takes into account a meltdown of the reactor core. If there was an accident at the fuel pools (waste), casualties would be MUCH greater. On average, fuel pools hold about 4 or 5 times as much radioactivity as a reactor core.

1982 CRAC Report also calculates costs from an accident, in 1980 dollars.

- ✓ For Limerick 1, \$213 billion
- ✓ For Limerick 2, \$197 billion.

Inflation since 1980 means costs would be even more astronomical today.

- There are "beyond design basis accidents" that are well within the realm of possibility.

- NRC only concerns itself with “design basis accidents,” ones they “CLAIM” as realistic enough to care about.
- Of course, worse accidents are possible, NRC just doesn’t want to have to deal with them or even think about them.

The best example - NRC’s design basis threat for a terrorist attack foresees 5 attackers. What about the 19 attackers that coordinated the 9/11 attacks? NRC has just declared more than 5 attackers “beyond design basis.”

- Accidents or attacks could easily be beyond what NRC chooses to deal with.

The Three Mile Island accident was considered so remote an accident scenario as to be disregarded in analyses – BEFORE it happened, that is.

- Now, even at the Limerick Township meeting 7/13/06, NRC is still attempting to ignore the studies and deny documented harmful impacts which actually took place around TMI after that accident.

Another example is reactor pressure vessel embrittlement, and the growing risk of pressurized thermal shock (PTS) at pressurized water reactors such as Palisades in MI.

- If the reactor pressure vessel were to fracture due to embrittlement and PTS, the accident that would unfold would be “beyond design basis.”
- The 1982 CRAC-2 report figures for Palisades are: 11,000 deaths, 7,000 injuries, and \$52.6 billion in property damages. Of course, those are for 1980 Census figures, and 1982 dollars.
- Given growth in population, and inflation, and beyond design basis accidents like PTS fracturing leading to full scale melt down and massive radiation release, those CRAC-2 figures can be regarded as very conservative.

NRC cites the National Research Council 2002 report stating, “*the threat of terrorist attacks on spent fuel storage facilities....is highly dependent on design characteristics.*”

ACE Response:

- **This statement makes our point. Our region needs the most protective and preventive cask design characteristics for Limerick to PREVENT (to the degree possible) terrorist attacks.**
 - While NRC cited this report which makes our point, NRC at the same time steered us away from reports that REALLY make the point about terrorism!
 - NRC cites a 2002 National Research Council report, but does NOT cite the 2005 NAS report which pointed to dry cask storage as at risk of terrorist attack.
 - See: <http://www.nirs.org/reactorwatch/security/securityhome.htm> and then April 2005 in chronological listing for info on that NAS report that it seems NRC wishes to keep us in the dark about.
 - The 2005 NAS study also found irradiated fuel storage pools vulnerable to terrorist attack and massive radiation release, especially at Mark I and Mark II boiling water reactor plants, the design of Limerick Nuclear Power Plant.
- NRC sponsored these studies – It is shameful for them to ignore or hide them from us.**

NRC states, “*Differences in the design...make it difficult to compare the relative safety of each method.*”

ACE Response:

- It is both baffling and outrageous that NRC appears to be fine doing NOTHING, using the excuse of difficulty in comparing the relative safety of each method, after the information presented to NRC in the 2005 NAS report.

- The 2005 NAS report found that both storage pools and dry casks can be potentially vulnerable to catastrophic terrorist attack, a fact that NRC just denied at the public meeting in Limerick 7/13/06
- Some are more vulnerable than others depending on design. Boiling water reactors such as Limerick are amongst the worst.
- It seems crystal clear that the current design for dry cask storage at Limerick would be among the worst designs under terrorist attack.

Waste Confidence

NRC claims there will be a safe solution to storing massive amounts of high-level radioactive wastes from all over the nation at over 103 nuclear reactors - "BECAUSE WE SAY SO."

The Waste Confidence Rule is NRC making the "claim" there will be a safe place to store massive amounts of ever-growing piles of high-level radioactive wastes from 103 reactors all over the nation, "because we (NRC) say so." NRC is hoping Congress will say so too, and Bush will sign it into law. This is kind of like Congress deciding to overturn the Law of Gravity. They can do that if they want to, but gravity will still be there. So will the high-level nuclear wastes piling up at the 103 nuclear reactor sites with nowhere to go.

NRC tells us Limerick is allowed to continue to operate even though there is no permanent disposal site of the nation's spent fuel because of the "waste confidence decision." NRC states that the Commission (NRC) made a generic determination that spent fuel can be stored safely without significant environmental impacts for at least 30 years beyond the licensed life for the operation of that reactor at onsite or offsite dry cask installations.

ACE Response:

- There is no safe way to dispose of high level radioactive wastes from nuclear power plants, and it appears there never will be, given the fact the waste can remain radioactive for hundreds of thousands of years. **NO WASTE CONFIDENCE DECISION** by NRC can change that fact. Nuclear power plants must be shut down so that we only have to deal with the current waste and not make more.
- NRC's determination ignores the reality of accidents, incidents, and terrorist attacks that can all lead to disaster. After admitting that each design is different, and knowing some sites would pose more risk than others, it is highly irresponsible to make a generic determination.
- The fact is clear. There is no off-site, away-from-reactor dumpsite yet.
- Yucca's predicted opening date is 2018, according to DOE, when cornered. They don't like to talk dates at all anymore, because they always miss them.
- That's getting close to 2025, the year NRC's "waste confidence decision" says a dump will open.
- What happens when Yucca goes down for good, as it should?
- It's been in process since the late 1970s, for 25 to 30 years.
- Wouldn't the next targeted dumpsite take at least as long to try to force open against the will of the "host" community/state?
- NRC's OVER confidence in having a safe place to store this deadly waste is a disservice to humanity.

- But Congress is trying to ENACT the NRC's "confidence" – by simply writing into law that "waste will be disposed of in a timely manner" – all of this is an attempt to stop citizens from taking this issue into the courts – The bill is meant to stop citizens from defending themselves, while enabling the nuclear utilities to make a limitless amount of waste, despite having no solution for it.

NRC states, "*the commission believes there is reasonable assurance that at least one repository will be available within the first quarter of the 21st century, and sufficient repository capacity will be available 30 years beyond the licensed life for any reactor to dispose of its high-level waste.*"

ACE Response:

The state of Nevada first petitioned the NRC to erase its waste confidence decision, arguing that it biased NRC in favor of licensing Yucca.

- NRC's beliefs and/or reasonable assurances are little comfort to those who live around ever-growing piles of high level deadly radioactive wastes, including those who will be unfortunate to live around the destination for most all of it.
- Yucca Mountain should never open for many reasons, including important scientific reasons about the inherent high level radioactive threats. If the public health and safety interests prevail, Yucca Mountain will never open.
- Imagine how long a 2nd repository would take to open, even if Yucca is ever opened.
- Other states will have seen what happened to Nevada, and will fight hard to make sure it doesn't happen to them. We believe Nevada may have now taken this issue to court, so hopefully the courts will soon rule in favor of NV.
- Tragically, it seems clear that those who support the nuclear industry, and have blind trust in NRC, are trying to enact into law the waste confidence decision, so that not even the courts can touch it.
- We don't believe NRC's "waste confidence rule" is worth the paper it's written on.

We believe NRC's responses to ACE 6/16/06 and our investigated responses in this document provide additional evidence that NRC is a dangerous instrument for the nuclear industry! Clearly, evidence suggests NRC's top priority is NOT public health and safety. WHY does NRC worry more about bad PR and monetary costs for the nuclear industry than public health and safety? The answer seems clear – NRC FUNDING SOURCES.

Where does NRC get most of its funding? It appears:

- Final Fiscal Year 2007 – NRC has an \$808 million dollar budget
 - Appropriation estimate from taxpayers for NRC
 - \$152 million of an \$808 million budget paid by taxpayers
 - The nuclear power industry itself
 - \$656 million would come from nuclear licensees

Even the terms used by the nuclear industry and NRC are deceptive and misleading.

- We regard the term "spent fuel" as an industry euphemism. It is – "deadly high-level radioactive waste." In reality, Limerick Nuclear Power Plant's irradiated nuclear fuel rods are far more radioactive after use. The only thing that's "spent" is our money as ratepayers and taxpayers, and our patience as concerned citizens.
- The term "cask" suggests death, yet the fuel rods remain radioactive for tens of thousands of years.

The Alliance For A Clean Environment
(610) 326-6433

Notice of Violation

Issued by NRC 7/10/06

For Radioactive Waste Casks
Designed For Limerick

For Transnuclear - 10 NUHOMS - 61BT
Limerick is mentioned
and
Limerick's OS-197H Transfer Cask

**Besides NOVs there were several areas
where discrepancies were noted.**

We believe this provides even more evidence to validate our concern over the Quality of Transnuclear Casks and their use for Limerick.

The deadly high-level radioactive waste will far outlive any container in which it is placed, but to start with a flawed cask design is just asking for an accidental disaster.

July 10, 2006

Ms. Tara Neider
President and Chief Operating Officer
Transnuclear Incorporated
7135 Minstrel Way
Columbia, MD 21045

SUBJECT: NUCLEAR REGULATORY COMMISSION (NRC) INSPECTION REPORT NO.
72-1004/2006-203 AND NOTICE OF VIOLATION

Dear Ms. Neider:

This refers to the inspection conducted June 5-16, 2006, at Kobe Steel, Ltd. (KSL) in Takasago, Japan, and Hitachi Zosen Mechanical Corporation (HMC) in Ariake, Japan. KSL and HMC are contracted fabricators of dry storage cask components for Transnuclear, Incorporated (TN). The inspection was conducted to determine if fabrication activities were performed in accordance with the requirements of 10 CFR Parts 21 and 72, the applicable certificates of compliance, and TN's NRC-approved quality assurance program. The enclosed report presents the results of this inspection.

Based on the results of this inspection, the NRC has determined that a violation of NRC requirements occurred. The violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it are described in detail in the subject inspection report. The violation is being cited in the Notice because it was identified by the NRC.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your

T. Neider

-2-

response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

Robert J. Lewis, Chief
Transportation and Storage Safety and
Inspection Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-1004

Enclosures:

1. NRC Inspection Report No. 72-1004/2006-203
2. Notice of Violation.

U.S. NUCLEAR REGULATORY COMMISSION
Office of Nuclear Material Safety and Safeguards
Spent Fuel Project Office

Inspection Report

Docket: 72-1004

Report: 72-1004/2006-203

Certificate Holder: Transnuclear Incorporated (TN)
7135 Minstrel Way
Columbia, MD 21045

Fabricators: Kobe Steel, Ltd. (KSL)
2-3-1, Shinhamia, Arai-Cho
Takasago-City, Hyogo-Pref., 676-8670 Japan

Hitachi Zosen Mechanical Corporation (HMC)
Ariake Facility
Nagasu-Machi, Tamana-Gun
Kumamoto, 869-0113 Japan

Inspection Dates: KSL: June 5-9, 2006
HMC: June 12-16, 2006

Inspection Team: Frank Jacobs, Team Leader (HMC), Spent Fuel Project Office (SFPO)
James Pearson, Team Leader (KSL), SFPO
Robert Temps, Senior Inspector, SFPO

Approved by: Robert J. Lewis, Chief
Transportation and Storage Safety
and Inspection Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

T. Neider

-2-

response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

Robert J. Lewis, Chief
Transportation and Storage Safety and
Inspection Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-1004

Enclosures:

1. NRC Inspection Report No. 72-1004/2006-203
2. Notice of Violation

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Distribution:

Docket 72-1004 NMSS r/f SFPO r/f GMorrell, IMNS
WRulañd, SFPO MSchwartz, OE SScrutchfield, OCFO

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ML No.:

OFC:	SFPO	E	SFPO	E	SFPO	E	SFPO	E
NAME:	JPearson		FJacobs		MDeBose		RLewis	
DATE:	7/06/06		7/ 06 /06		7/06/06		7/ 06/06	

OFFICIAL RECORD COPY

NOTICE OF VIOLATION

Transnuclear, Inc.
Columbia, MD

Docket No. 72-1004

During an NRC inspection conducted at Hitachi Zosen Mechanical Corporation (HMC) in Ariake, Japan, on June 12-16, 2006, a violation of NRC requirements was identified. HMC is a fabricator of spent fuel dry storage cask components for Transnuclear, Inc. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

10 CFR 72.150, "Instructions, procedures, and drawings," requires, in part, that a certificate holder shall prescribe activities affecting quality by documented procedures and require that these procedures be followed.

Contrary to the above, HMC procedures requiring thickness inspection of temporary attachment weld removal areas and recording of the thickness, were not followed. Specifically, Report No. TAW-56C,D, dated May 23, 2006, for the inner bottom cover of dry storage canister shell serial number 21 of job 16F10033, did not document thickness inspection of all temporary attachment weld areas as required by HMC procedure Document No. 033-F-TAW, "Control Procedure for Temporary Attachment Welds," Rev. 2, and Document No.: 033-T-UT-T, Rev. 0, "Thickness Measurement (UT) Procedure for Shell Welds, Plates." Additionally, Final Data Packages for dry storage canister serial nos. 13 and 14 of the same job did not document the required thickness inspections for those canisters.

This is a Severity Level IV violation (Supplement VI).

Pursuant to the provisions of 10 CFR 2.201, TN is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555, with a copy to Robert J. Lewis, Chief, Transportation and Storage Safety and Inspection Section, Spent Fuel Project Office. This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is

necessary to provide an acceptable response, then please provide a bracketed copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post the Notice within two working days.

Dated this 10th day of July 2006.

EXECUTIVE SUMMARY

Nuclear Regulatory Commission (NRC) Inspection Report 72-1004/2006-203

From June 5 through June 16, 2006, an inspection team from the Office of Nuclear Material Safety and Safeguards, Spent Fuel Project Office (SFPO), performed an inspection of selected activities for spent fuel dry storage and transportation casks being fabricated in Japan for Transnuclear, Inc. (TN), for use in the United States. The team inspected fabrication activities to determine if they were performed in accordance with the requirements of 10 CFR Parts 21 and 72, the applicable certificates of compliance, and TN's NRC-approved quality assurance program.

The team performed the inspection at two fabrication facilities: Kobe Steel, Ltd. (KSL), in Takasago, and Hitachi Zosen Mechanical Corporation (HMC), in Ariake. The team examined management, design, and fabrication controls, and assessed the oversight by TN and the reactor licensees.

Fabrication work in progress at KSL included TN-68 casks for Peach Bottom, TN-40 casks for Prairie Island, and NUHOMS-32PT canisters for Point Beach. Fabrication of eleven NUHOMS 32PT canisters for Palisades had recently been completed.

A significant amount of work was in progress and scheduled for near-term starts at HMC. Current fabrication work included orders of thirteen NUHOMS-24PHBL canisters for Oconee and ten NUHOMS-61BT canisters for Susquehanna. Planning and material procurement was underway for canisters for St. Lucie, Turkey Point, Seabrook, Limerick, Palisades, and Monticello, as well as an OS-197H transfer cask for Limerick. Recently completed work included transfer casks for Surry, North Anna, and Millstone, and NUHOMS 32PT canisters and a light transfer cask for Fort Calhoun.

The first week of inspection was completed on June 9, 2006, at KSL. The team found the quality of the construction of the casks to be acceptable and the TN and licensee oversight of fabrication activities to be adequate. The team did not identify any findings of significance. KSL issued two Corrective Action Directives as a result of the team's observations.

The second week of inspection was completed on June 16, 2006, at HMC. The team found the quality of the construction of the casks to be acceptable and the TN and licensee oversight of fabrication activities to be adequate. The team identified one violation of NRC requirements involving the failure of HMC to follow procedures that required a thickness inspection of dry storage canister shell thickness after removal of temporary attachment welds. The finding is summarized in Table 1 below. HMC issued three Corrective Action Reports as a result of the team's finding and other observations.

Table 1
Summary of Inspection Findings

Regulatory Requirement 10 CFR Section	Subject of Violation or Noncompliance	Number of Findings	Type of Finding	Report Section
72.150	Instructions, procedures, and drawings	1	Violation	4.2.3

INSPECTION PROCEDURES USED

IP 60852, "ISFSI Component Fabrication by Outside Fabricators"
 NUREG/CR 6314, "Quality Assurance Inspections for Shipping and Storage Containers"

LIST OF ACRONYMS USED

AVL	Approved Vendor List
CAD	Corrective Action Directive
CAR	Corrective Action Report
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
DSC	Dry storage canister
HMC	Hitachi Zosen Mechanical Corporation
KSL	Kobe Steel, Ltd.
NDE	Nondestructive examination
NMC	Nuclear Management Company
NRC	U.S. Nuclear Regulatory Commission
PCL	Process Checklist
QA	Quality Assurance
SFPO	Spent Fuel Project Office
TAW	Temporary attachment weld
TN	Transnuclear, Inc.
WPS	Welding Procedure Specification

PERSONS CONTACTED

The team held an entrance meeting at KSL on June 5, 2006, and at HMC on June 12, 2006, to present the scope and objectives of the NRC inspection. On June 9 and June 16, 2006, the team held exit meetings at KSL and HMC, respectively, to present the preliminary results of the inspection at each location. The individuals present at the entrance and exit meetings are listed below in Table 2.

Dangerous, Deceptive Dispute About Design Flaws For High Level Radioactive Waste Storage At Limerick Nuclear Power Plant

NRC Dismissed A Nuclear Engineer's Corrosion Concerns For NUHOMS Casks Based On An Evaluation Done By Transnuclear (TN), The Company With A Vested Interest In The Outcome

ACE received comments and concerns from a nuclear engineer relevant to high level radioactive storage proposed for Limerick Nuclear Power Plant.

We officially requested NRC to investigate and respond to each of the nuclear engineer's statements and concerns about NUHOMS casks planned to store high-level radioactive waste at Limerick Nuclear Power Plant. NRC should have done a comprehensive hands-on investigation of each of the issues raised by the nuclear engineer which ACE clearly identified for NRC several times since April, 2006.

Instead, NRC referred the nuclear engineer's concerns to Transnuclear, the company that was supposed to be investigated. Why would NRC expect us to believe this company would admit the potential for problems when they already installed many of these casks? NRC used that company's biased conclusions to dismiss the nuclear engineer's concerns. This is unacceptable, especially when it comes to the potential for devastating long-term consequences.

Listed below in italics and quotes are statements and concerns sent to ACE by the nuclear engineer. Following each of the nuclear engineer's statements are comments and questions which ACE requested to be answered by NRC. NRC's October 17, 2006 responses are identified.

1. *The nuclear engineer wrote, "NUHOMS is designed for air to enter the inside of the concrete structure which holds the radioactive waste containers. It is only a matter of time before the steel tubes turn to rust. These tubes are not visible or accessible. The 40-ton radioactive waste containers 'filled with the nastiest of man-made stuff' are placed on a set of steel columns. The containers lie horizontally, six feet up in the air, resting unfastened, on that set of steel columns, which are bound to deteriorate in the corrosive air environment. What happens when they cannot hold the weight of the container and the container comes crashing down to the concrete surface below? There's no proof the container is strong enough to remain intact after falling six feet. Imagine the catastrophe from dozens of these cylinders crashing to the ground."*

ACE Comments to NRC:

The industry has taken the unverifiable position that the steel proposed for Limerick casks will not corrode. Casks at Limerick will be blown to cool with extremely corrosive air, 24 hours a day, 365 days a year for decades, if not forever. We do not believe that under the extremely corrosive conditions at Limerick Nuclear Power Plant, that either NRC or the industry can provide proof that the steel will not corrode after decades of exposure. Steel planned for Limerick casks has not been in place in extremely corrosive conditions such as exist around Limerick for a long enough time to guarantee there will not be corrosion over decades of exposure, especially on the welded areas.

The air constantly cooling the high-level radioactive wastes at Limerick (24 hours a day, 365 days a year) can cause corrosion for a number of reasons.

- 1) Limerick Nuclear Power plant emits about 35 MILLION GALLONS of steam into the air every day.
- 2) Multiple extremely corrosive chemicals are added to the 35 million gallons. (MSDS sheets obtained by ACE verify this). Common sense suggests corrosive chemical additives are emitted with the 35 MILLION GALLONS of steam every day.
- 3) Limerick Nuclear Power Plant is bordered by the Schuylkill River, another source of moisture in the air.
- 4) Sulfur compounds are of major concern. Just 5 miles upwind from Limerick Nuclear Power Plant, the Pottstown Landfill emits massive amounts of sulfur compounds into the air from 5 continuous combustion sources. There are other industrial air pollution sources of sulfur compounds immediately upwind from the nuclear power plant.

TN Responses to NRC 10/17/06 Regarding Responses to the Nuclear Engineer and ACE

- TN concluded their canister support structure will maintain its integrity for a period in excess of 50 years at the Limerick site.
- TN stated the support structure design analysis include a minimum metal thickness to support corrosion of approximately 60 mils for A36 steels.
- TN stated that its 2000 study conclusion was: "Both the A36 and A193 GradeB7 (*sic*) steels appear to have sufficient general corrosion resistance of the intended 100 year design life.
- TN said, "Although coatings would provide additional corrosion protection, the survival of the coating does not appear to be necessary for these materials' success."
- TN provided discussion of data on similar alloys exposed to a marine environment (800' from the ocean) for a significant period of time.
- TN concluded using the TN commissioned evaluation that the maximum uncoated loss of thickness over a period of 50 years was determined to be .023" TN contends their "estimates" are conservative because alloys will be sheltered due to concrete walls and will be coated to minimize corrosion.
- TN contends that because Limerick is located inland, it is not subject to severe coastal climates.
- TN indicated that data (on CORROSIVE CHEMICAL ADDITIVES to nuclear power plant steam) provided by Exelon did not change any TN conclusions.

ACE REALITY CHECK Our 11/3/06 Response to NRC

- 1) TN's responses reveal that in reality this is a very dangerous experiment. TN's biased conclusions provide NO basis for guaranteed protection of public health and safety for potentially over a million people in the centuries ahead.

- 2) Unless TN's conclusions are based on site-specific modeling using air at Limerick on actual materials planned for casks, they are unreliable. TN's conclusions are not based on researched site-specific hard facts.
- 3) TN's conclusions about their materials for their products to be used at Limerick are based on 50 and 100 years when the deadly high-level radioactive wastes being stored in TN's storage system will remain highly radioactive for hundreds of thousands of years and will likely remain in Limerick forever.
- 4) TN admits coatings would provide additional corrosion protection, but claims they are not necessary. That conclusion is likely more based on cost than documented fact. TN isn't willing to spend the money for coatings which they admit would provide additional corrosion protection.
- 5) In one paragraph TN claims coating won't be necessary. In another, TN suggests 50 year estimates are conservative because coating will minimize corrosion.
- 6) TN "ESTIMATES" there will be LOSS of THICKNESS (.023" in 50 years) and (.039" in 100 years). This proves the obvious – the high-level radioactive wastes will far outlive any container in which it is stored. What would losses be if estimated by a public interest expert? How much loss will there be in hundreds of years?
- 7) TN claims their "estimates are conservative" based on concrete walls, coating, and because Limerick is located inland. **TN'S CLAIMS ARE ILLOGICAL.**
 - Concrete walls won't protect the steel from corrosive air that is intentionally circulated around it 24 hours a day, 365 days a year, to cool the high-level radioactive wastes inside the steel.
 - TN earlier refuses claimed coating is unnecessary. How can it protect the steel if it is not used?
 - While Limerick is inland of an ocean, it is bordered by the Schuylkill River. And Limerick Nuclear Power Plant emits at least 35,000,000 gallons of steam every single day causing extreme moisture in the air which will be cooling the casks. Air in the region is extremely loaded with sulfur compounds, due to massive combustion.
- 8) TN's refusal to change any conclusions, dismissing Exelon's corrosive chemical additives as a factor for corrosion is expected, but unacceptable.

NRC Staff Evaluation 10/17/06

NRC Staff Said:

1. Steel for the canister support structure has a conservative calculated corrosion rate that takes into account the expected corrosion over 20 year licensing basis for the design.

ACE Response

- NRC admits there will be corrosion.
- NRC admits the corrosion rate is "calculated."
- Site-specific actual corrosion rate is UNKNOWN.

Why is NRC staff only concerned about corrosion for a 20 year licensing period? Limerick's high-level radioactive wastes will remain deadly for thousands of years. In reality, casks will likely store this waste in Limerick far longer than 20 years, possibly forever.

NRC Staff Said:

2. Transnuclear specified application of a corrosion resistant coating over the support steel. The coating may be one of several systems. One system is inorganic zinc primer with an epoxy overcoat, designed to withstand very severe environments.

ACE Response:

- Page 1 – Transnuclear states, “Although coatings would provide additional corrosion protection, the survival of the coating does not appear to be necessary for these materials’ success.”

There are two clear issues of concern.

- 1) Transnuclear claims a coating does not appear to be necessary, yet NRC says they specify a coating will be used.
- 2) While a certain coating is discussed, NRC does not appear to know which coating, if any, Transnuclear will use.

NRC Staff Said:

3. “The steel is enclosed in a dry, interior-like environment that provides additional protection against corrosion.”

ACE Response

This is misleading at best. While enclosed, the steel is not protected against corrosive, humid air which must be continuously forced into the enclosed structure to constantly cool the high-level radioactive wastes. NRC is making a false assumption.

NRC Conclusion - Absolutely Irresponsible:

“Standardized NUHOMS provides ‘reasonable assurance’ that the system ‘will not experience any significant corrosion’ during the 20-year license.”

ACE Response:

It is not enough to provide “reasonable assurance” against corrosion for only 20 years. This waste will remain deadly for thousands of years and will outlive any container in which it is stored. It will also likely remain at Limerick forever. The longer it can be contained safely, the less danger to the public. The least NRC should do it require modeling of exact materials to be used in the exact corrosive air conditions at Limerick PRIOR to production and use.

Chemicals Added To Cooling Water System At Limerick.

NRC states:

1. *“They are standard water treatment chemicals used around the world.”*

ACE believes that just because something is done elsewhere is not an excuse to dismiss a threat at Limerick.

2. *“These chemicals are selected to treat or prevent specific conditions which would otherwise damage the plant water system components. Damage to the system could be in the form of corrosion, formation of biological growths, or other mechanisms.”*

ACE concludes that while these chemicals may protect Limerick’s interests, MSDS sheets on those chemicals added at Limerick suggest there is cause for concern to all who are exposed.

3. *“Chemical use must be compatible with environmental regulations.”*

Based on failure of regulations to deal with additive, cumulative, and synergistic impacts on human health, or to acknowledge the most recent research showing chemicals to be far more harmful than first thought, ACE suggests this statement does not insure protection to anyone exposed to these chemicals.

NRC Comments About Limerick's Water Treatment Chemical Additives Effects On Metals:

SULFURIC ACID

Used At Limerick For Cooling Tower Water Treatment

NRC States:

1. *"Sulfuric Acid is used to prevent scaling – the ever-accumulating, non-conductive, rock-like coating. ("scale") forms on insides of pipes, heat exchangers, and other components, hindering or crippling their ability to function."*
2. *"ACID ADDED is totally consumed in reacting with the naturally occurring alkalinity of the water that is partly responsible for scale formation."*
3. *"NO ACID REMAINS - Chemical reaction between the acid and alkalinity of the water produces water and a salt."*
4. *"With the acid addition, the pH of the cooling water system is maintained at 8.25, which is still well within the alkaline range where steel corrosion is "MINIMAL", but low enough to inhibit scale formation."*
5. *"NO Acid remains to be discharged through the plant water system or cooling tower."*
 - ACE believes only continuous monitoring can prove that the pH is always maintained at 8.25 and that NO Sulfuric Acid is discharged into the air or water. There are valid reasons for variations that would lead to excessive acid emissions.

SODIUM HYPOCHLORITE, SODIUM BROMIDE, BIOCIDES

Used At Limerick For Cooling Tower Water Treatment

1. *"These biocides prevent and control biological growths such as algae, slime, etc within the cooling the system and cooling tower"*
2. *"Some are identical to swimming pool water treatment chemicals. Concentrations at Limerick are about 1/10 of what would be used in a swimming pool."*
 - ACE believes this is of particular concern since swimming pool chemicals usually contain chlorine chemicals which could be a serious threat to human health when released with 35,000,000 gallons of steam every day, even at very low levels.
3. *"This concentration level avoids adverse effects on metallic components in the water system."*
 - ACE questions this conclusion. Could this be one reason there has been so much trouble with equipment at Limerick?
 - NRC has no way of knowing exact amounts of any of the additive chemicals.
 - Employees informed ACE of accidents where a lot more chemicals were added than were supposed to be added.

MILD ACIDS or OXIDIZERS

1. "Mild acids or oxidizers inhibit formation of damaging scale by reacting with scale forming chemicals ... and render them into a chemical form which does not create scale.
2. "Inhibitors are totally consumed by this process."
3. "NONE remain to adversely affect metallic components.

➤ There is no site specific testing to validate this claim

ACE BELIEVES THAT CORROSIVE CHEMICALS ADDED TO LIMERICK'S COOLING WATER CAN BE A THREAT TO PUBLIC HEALTH AND THE STEEL HOLDING HIGH-LEVEL RADIOACTIVE WASTES IN THE ABOVE GROUND CASKS WHICH NEED TO BE CONTINUOUSLY COOLED WITH SURROUNDING AIR.

NRC OBSERVATIONS DO NOT PROVE OTHERWISE.

1. NRC states "MOST of the chemicals used are benign to metals.

ACE believes this shows some chemicals added to Limerick's cooling water are a threat. Logic suggests NRC cannot not accurately determine how much of a threat without continuous monitoring.

2. NRC states "chemicals potentially harmful to metals are totally consumed by chemical reactions or not present or used in concentrations low enough to not be a concern."

ACE believes this statement is based on information which has never been proven to be absolutely true at Limerick. Without continuous independent monitoring at Limerick neither conclusion can be proven to be totally accurate.

3. "NRC staff finds no potential adverse impact upon the metallic components of the NUHOMS design at Limerick."

ACE believes without continuous long term air testing, it is illogical and irresponsible to conclude that sulfuric acid and other corrosive chemicals added to the cooling water at Limerick are not emitted with the 35,000,000 gallons of steam every day.

Ability To Inspect Support Structure

NRC states, "Prior inspections have revealed the internal support steel to be virtually corrosion free after being in operation for a number of years. Visual inspection of the interior of a horizontal module using fiber optic technology was performed in 1993 and 1998 on a 1986 license NUHMOS - 7P system."

- NRC says these results are part of the basis for the decision that it is **unnecessary to impose periodic inspections for the internal support steel.**
- Based on coating of the structure and the visual inspection above, NRC determined that the NUHOMS canister support structure will not corrode and therefore it is not necessary to inspect them.

ACE believes there are 2 major points regarding NRC's dismissal of the nuclear engineer's concern.

1. 12 years is not nearly long enough to make such a determination about corrosion of this steel which will be constantly exposed to moist, corrosive air possibly over hundreds of years. The deadly high-level wastes the structures support will remain a threat to the public for thousands of years.
2. How were the workers that performed the visual inspection protected?

ACE 11/3/06 Response to NRC

ACE requested NRC require precautionary improvements in the cask design for Limerick Nuclear Power Plant. Precautionary measures for this risky endeavor could save untold devastation in the decades ahead.

- ✓ Use of best grade non-corroding stainless steel, with certification from the steel producer that they will be liable under conditions at Limerick. We understand 304 may not be the best non-corroding steel and even 304 has been inferior quality depending on where it is produced.
 - ✓ Certificated welds on caps, with those responsible signing to be liable under the conditions at Limerick. There have already been problems with welding on casks elsewhere.
 - ✓ Requirements that the six foot steel columns be fastened to the cement floor.
 - ✓ Sulfuric acid testing over at least one year, with continuous exposure to the same kinds of moist, corrosive air conditions that exist at Limerick.
 - ✓ An MRI arrangement for continuous monitoring for corrosion inside the cask where it may otherwise be impossible to detect corrosion, as well as continuous heat monitoring around the casks.
 - ✓ All monitoring data should be wired electronically to the NRC office on-site at Limerick, continuously recorded electronically, and available to the public at all times.
2. The nuclear engineer states that ***"Radiation leaks out of ventilation openings in concrete walls. Air which enters the concrete structure is needed to constantly cool off the contents inside the container. After the air is circulated, it exits into the air outside."***

- a. Experts we contacted suggest this would happen with slow leaks or sudden accidents.

ACE objects to visual inspections for several reasons. You can't see radiation and workers could face unnecessary risk. And a once a week or two week inspection is hardly protective. We understand that visual inspections only happen once every two weeks at another nuclear plant.

CRUCIAL NRC MONITORING REQUESTED WITH DATA IMMEDIATELY AVAILABLE TO THE PUBLIC AT A SPECIFIC WEBSITE

- ACE is requesting that air monitors to detect all kinds of radiation be placed on each side of the casks at elevations likely to detect problems immediately. Monitoring data should be directed to the NRC office on-site and checked at regular intervals during each day. All data, along with NRC reports on the data, should be posted at a website that the public can continuously review.

- ACE is also requesting that heat monitors collect data 24 hours a day, directed into the NRC office at Limerick Nuclear Power Plant, with readings by NRC taken at the beginning and end of each shift for NRC each day. All data and reports should be immediately available to the public at a specific announced website, along with a daily report posted on line for public review
3. The nuclear engineer states, ***"NRC law "Part 21" states that if a company knows of a defect in its product used at nuclear plants, it is supposed to notify NRC. Areva knows it installed dozens of containers around the country in which the steel tubes may be rusting away, completely undetected (because the outside of the tubes is not visible and the insides of the tubes are completely out of sight). Instead of admitting to the defect in the NUHOMS design and making changes before a tube structure collapses somewhere, Areva has been silent. Lack of (Transnuclear/Areva) action to notify NRC is a direct violation of the law (Part 21) and a shameful neglect of responsibility."***
 - ACE is calling on NRC to do a complete investigation into this alleged violation by the nuclear engineer.
 - If NRC finds this is a valid concern, we ask NRC to require precautionary changes to the NUHOMS cask design to reduce the risk of unnecessary corrosion at Limerick Nuclear Power Plant.
 4. The nuclear engineer states, ***"Pushing 40-ton containers of highly radioactive wastes into the container is a risky operation, especially for workers that could be irradiated."***
 - There have been reports of accidents and incidents with this operation. Human error has caused near catastrophes.
 - Exactly how are workers protected from the kinds of disasters that could happen?
 5. The nuclear engineer states, ***"To solve a problem from corrosive air or settlement of the ground below under the weight of the 40-ton-plus container and its concrete housing, or to dismantle the storage facility at the end of its life, you must be able to pull the container out of the NUHOM concrete housing."***
 - Transnuclear stated they must demonstrate they can pull the container back out before loading them and there is no problem with doing that. That is deceptive. Of course this can be done before it is loaded with deadly spent fuel and before any settling or corrosion takes place.
 - The only instance we can find where this was attempted after a problem took place, it failed. The defective cask is still loaded with deadly fuel and sitting at the same location where it will threaten an entire region forever.
 - We ask NRC to provide proof that containers were successfully pulled back out and unloaded after there was a problem. Please include location, length of time the cask was loaded, the problem which caused the unloading, detailed description of specific problems, and what was done with the defective load.
 6. The nuclear engineer states, ***"If you can't pull the containers out, you cannot transport the container to Yucca or anywhere. The site will become a permanent graveyard for nuclear fuel - a waste dump full of hundreds of millions of curies of radioactivity that takes over a million years to die down, in the back yard of this region forever."***
 - This statement is obvious and profound. Exelon admits these containers will sit at Limerick for many years before there is any attempt to move them to Yucca or somewhere else. During that time there is bound to be settlement and we believe a good possibility of corrosion making removal of wastes doubtful and extremely dangerous.
 - Based on the circumstances surrounding Yucca Mountain, we doubt all this high-level nuclear waste will ever be moved off the Limerick site and question the safety of transport both from accidents and creating even more inviting targets as radiological weapons for terrorists.
 - As far as we are concerned this is a ticking time bomb for which there is no good answer. As long as Limerick continues to operate, more of this high-level radioactive waste will

continuously be filling the fuel pools, requiring more and more above ground high-level radioactive waste storage, continuously adding to the threat.

- This is a major reason we call upon NRC to get this right, here and now.

7. The nuclear engineer states that ***“DOE will not use the NUHOMS design for the storage facility planned to be built in Nevada, because, among other concerns, DOE is concerned about the feasibility of removing the container after some period of storage due to settlement. DOE does not even consider NUHOMS to be fit for use in a dry desert away from population centers.”***

- Why would NRC allow NUHOMS technology at Limerick, where an enormous population, settlement, and corrosion are all major factors, when DOE does not consider NUHOMS to be fit in a dry desert away from population centers in Nevada? PLEASE ADDRESS THIS QUESTION WHICH YOU EXCLUDED IN YOUR MAY 24 ATTACHMENT.
- Based on DOE's rejection of NUHOMS casks, ACE is urging NRC to reject the NUHOMS design for the Limerick Nuclear Power Plant, where the potential for problems can be even greater than in Nevada.

8. The nuclear engineer states, ***“NUHOMS module is not even made by pouring concrete. Pre-cast concrete blocks are trucked to the site, assembled by bolting the blocks together. They are not even anchored to the concrete floor. A rectangular box made by field assembling pre-cast concrete blocks may not be the safest kind of housing enclosure of deadly nuclear fuel.”***

- Poured concrete obviously could add to the safety of the cask design.
- ACE requests that for Limerick Nuclear Power Plant casks that NRC reject the NUHOMS current module of pre-cast concrete blocks which aren't even anchored to the concrete floor and that NRC require instead poured concrete with the requirement that it is attached to the concrete floor.

9. The nuclear engineer states, ***“Industry scuttlebutt suggests NUHOMS concrete enclosure falls apart and the container is breached under a Boeing airplane strike.”***

- This issue is a glaring omission in your May 24 letter of concerns.
- Is NRC aware of the potential for concrete enclosures to fall apart under a Boeing airplane strike?
- Is there a report on this? It has been suggested that NRC is unwilling to publish such a report to prevent panic. Has NRC withheld the report to “prevent panic” in communities where NUHOMS have been installed?
- ACE rejects the notion that NUHOMS concrete should be permitted to be used at Limerick just to prevent panic elsewhere. The public needs and deserve the truth and accountability from NRC, the agency paid with public tax dollars to protect the public. To continue to further jeopardize communities just to prevent panic is unacceptable.
- Unless NRC rejects the kind of cement used in NUHOMS designs for Limerick as a precautionary measure, ACE intends to request a full scale GAO investigation into NRC and this issue.

10. The nuclear engineer stated, ***“This camouflaged nuclear waste (in casks) is engineered to collapse on its own due to corrosion. NUHOMS may be a sitting duck in the face of a crashing aircraft.”***

- In a post 9/11 world NRC should be proceeding with cask oversight using every precaution in every decision, particularly those having to do with crashing aircraft.
- This is especially true at Limerick Nuclear Power Plant. There are two airports operating within five miles of that nuclear plant.
- The Limerick Airport is only about 1 mile away from the Limerick Nuclear Plant. Recently, a drunken pilot flying in and out of that airport put a real scare into everyone. It puts into perspective the real potential for an accidental disaster from a plane flying into an above ground cask. We believe even a small plane could potentially cause a disaster in the current proposed cask design at Limerick Nuclear Power Plant.

- Another long time pilot stated, "if a pilot decides to fly into something there is no way to stop that." Why would NRC continue to allow the Limerick Airport, only about 1 mile from the nuclear plant, to operate when these casks are built and filled? ACE is calling for the Limerick Airport to be closed as long as there are filled casks at Limerick Nuclear Power Plant. Why permit such an unnecessary threat?
- The region around Limerick is one of the most densely populated areas around a nuclear power plant. We believe Limerick is a prime target for terrorists, with above ground casks increasing that threat, making it an easier target for small planes as well as anti-tank missiles or other special weaponry.
- All the more reason for NRC to require the safest, most protective technology for casks used at the Limerick Nuclear Power Plant, whether they are made by Transnuclear or some other cask company.

II. The nuclear engineer wrote, "Technology used by Areva for NUHOMS is old and downright dangerous."

There are safer technologies. NRC has refused to require improved design for casks used at Limerick, which could provide extra protection for these inviting terrorist targets.

Steel used for casks:

- a. Transnuclear is using less than 1" steel at Limerick
- b. German Höltec casks (considered to be the Cadillac of casks) are made of 15" cast iron and even they were penetrated by army missile testing.

ACE is requesting that NRC require Exelon to bunker Limerick casks to avoid easy detection.

- To minimize damage from a terrorist attack, the cement housing should be of the finest grade and far thicker than that currently proposed by Transnuclear
- Casks should be spread out to minimize the target so that a large-scale explosive attack would involve only a limited number of casks.

Casks are exposed terrorist targets:

- a. Casks are easily identifiable and vulnerable to terrorist attack being outdoors and concentrated in rows in plain view. They are pre-deployed weapons of mass destruction. They are potential targets for attacks using remotely fired anti-tank missiles or other special weaponry.
- b. March 27, 2006, the Transnuclear salesman dismissed ACE concerns about missiles and air strikes with a deceptive statement, "casks are low profile."
- c. Height of casks does not dismiss concerns about terrorist attacks. Casks are well over six feet high. Video of the commercial aircraft hit at the Pentagon disputes Transnuclear's misleading low profile rhetoric.
- d. Enormous, expansive casks make a significant target, for a suicide air strike, even with a small aircraft.

ACE Is Urging NRC To Seriously Consider ACE Recommendations For Improvement To The Cask Design At Limerick And To Include All Recommended Safeguards. Protect The Public's Interests And Hold Exelon Accountable To Provide The Safest Design To Store Its Deadly Radioactive Wastes.

The Alliance For A Clean Environment (610) 326-6433

June 7, 2006

The Mercury

A4 / Wednesday, November 29, 2006



OUR VIEW

Permanent solution still lacking for nuke fuel rods storage

In many other industries, the difficult environmental questions center on how to safely dispose of raw materials used in a plant or process.

But when it comes to generating nuclear energy, disposal is out of the question. The highly radioactive byproducts of nuclear energy — the spent fuel rods — instead have to be “stored” indefinitely. This begs an entirely different set of questions and dangerous scenarios.

At Exelon Nuclear’s Limerick Generating Station, the storage of spent fuel rods has demanded some attention and recent action, as the 20-year-old plant’s accumulated spent fuel is exceeding the initial storage location. As a replacement, Limerick Township Board of Supervisors in July approved land development plans for the Exelon plant to install a concrete pad on which its own dry cask storage facility will be erected.

During meetings on those subjects, officials with Exelon and the Nuclear Regulatory Commission insisted the dry casks would only be needed for temporary storage and that the fuel would eventually be moved to Yucca Mountain, a federal disposal site proposed in Nevada.

However, with the November takeover of Congress by the Democrats, opponents of the federal government’s planned spent nuclear fuel storage facility beneath Nevada’s Yucca Mountain gained a powerful new ally. Harry Reid, the new Senate Majority Leader from Nevada, told reporters in his home state last week that the much-delayed, over-budget project is “dead right now.”

Originally targeted for opening in 1998, the Energy Department now says the best case scenario for the opening of the Yucca Mountain facility is 2017.

It is intended to hold 77,000 tons of the radioactive spent fuel left over after it has been used to boil water in the nation’s nuclear reactors. About 50,000 tons of that fuel is now stored in dry casks at 65 power plants, including Limerick’s, in 31 states, according to the Associated Press. Reid said that keeping the fuel in dry cask storage at the nation’s nuclear power plants will keep it safe for 100 years.

Others are not so sure.

Edward F. Sproat, director of the Energy Department’s Office of Civilian Radioactive Waste Management, told The Associated Press that leaving the fuel stored at the plants is just “pushing the solution off to future generations.” Limerick supervisors’ Chairman David Kane called the idea of leaving the fuel at individual power plants “a terrible solution.”

Beth Rapczynski, a spokeswoman for Exelon, said, “It’s important to keep in mind that the federal government has an obligation under the law to build a central repository for used nuclear fuel, which was mandated by Congress in the Nuclear Waste Policy Act of 1983. “Since then, consumers of nuclear-generated electricity have paid more than \$25 billion into the Nuclear Waste Fund for that purpose,” Rapczynski said.

While everyone passes the buck on how to best store the spent fuel, the residents of the tri-county area surrounding the Limerick plant live each day with the material in our midst. The latest wrinkle that makes Yucca Mountain even more remote as a possibility underscores the importance of making “temporary” storage at Limerick as safe as it can be.

After all, it may not be temporary, and the area’s future safety may be at stake.



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Pottstown, Pennsylvania

Storage of spent nuclear fuel rods at Limerick plant could become permanent

By Evan Brandt

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LIMERICK — The “temporary” storage of highly radioactive spent nuclear fuel rods at Exelon Nuclear’s Limerick Generating Station could become permanent, at least as far as the new Democratic leader of the U.S.

Senate is concerned.

With the November takeover of Congress by the Democrats, opponents of the federal government’s planned spent nuclear fuel storage facility beneath Nevada’s Yucca Mountain gained a powerful new ally.

Harry Reid, the new Senate Majority

Leader, hails from Nevada and told reporters in his home state last week that the much-delayed, over-budget project is “dead right now,” according to reports by The Associated Press.

Originally targeted for opening in 1998, the Energy Department now says the best case scenario for the

opening of the Yucca Mountain facility is 2017.

It is intended to hold 77,000 tons of the radioactive spent fuel left over after it has been used to boil water in the nation’s nuclear reactors. About 50,000 tons of that fuel is now stored in dry casks at 65 power plants in 31

states, according to the Associated Press.

One of those plants is in Limerick.

In July, Limerick’s Board of Supervisors approved the land development plans for the Exelon plant to install a concrete pad on which its own

(See FUEL ROD STORAGE on A6)

Storage of spent nuclear fuel rods at Limerick plant could become permanent

(FUEL ROD STORAGE from A1)

dry cask storage facility will be erected.

During meetings on those subjects, officials with Exelon and the Nuclear Regulatory Commission insisted the dry casks are only needed for temporary storage and that the fuel will be moved to Yucca Mountain when it opens.

But Reid told reporters that not only would he refuse to allow any bill that helps the Yucca project to reach the Senate floor during his tenure over the next two years, but also that funding for the project may dry up quickly.

Reid also said that keeping the fuel in dry cask storage at the nation's nuclear power plants will keep it safe for 100 years.

That's not cutting it for Edward F. Sproat, director of the Energy Department's Office of Civilian Radioactive Waste Management. He told The Associated Press "leaving everything where it is, is not a solution to the problem."

Leaving the fuel stored at the plants is just "pushing the solution off to future generations," Sproat said.

But don't count Limerick supervisors' Chairman David Kane among those overly concerned by Reid's statements.

"I don't believe the decision is his to make," Kane said of Reid's pledge to oppose the Yucca Mountain project, adding he is "not surprised" that Reid has taken that position.

He called the idea of leaving the fuel at individual power plants, Limerick included, "a terrible solution" and added "I'm confident the federal government will continue to pursue the best possible solution."

Kane added that the township would continue to "be aware and monitor the situation."

Asked about Reid's comments, Beth Rapczynski, a spokeswoman for Exelon, said, "It's important to keep in mind that the federal government has an obligation under the law to

build a central repository for used nuclear fuel, which was mandated by Congress in the Nuclear Waste Policy Act of 1983.

"Since then, consumers of nuclear-generated electricity have paid more than \$25 billion into the Nuclear Waste Fund for that purpose," Rapczynski said.

"While we believe dry cask storage is a safe interim solution, we continue to fully support Yucca Mountain as the long-term storage solution for used nuclear fuel," she said.

Donna Cuthbert, vice president of the Alliance for a Clean Environment, does not support Yucca Mountain and lauded Reid's stand in the issue.

"The more I've studied this issue, the more I've come to realize the removal and transport of this deadly waste is as much or more of a threat than keeping it where it is now," Cuthbert said. "I commend Sen. Reid for taking a thoughtful approach to this."

"Yucca is a scientifically unsafe place to put this fuel and

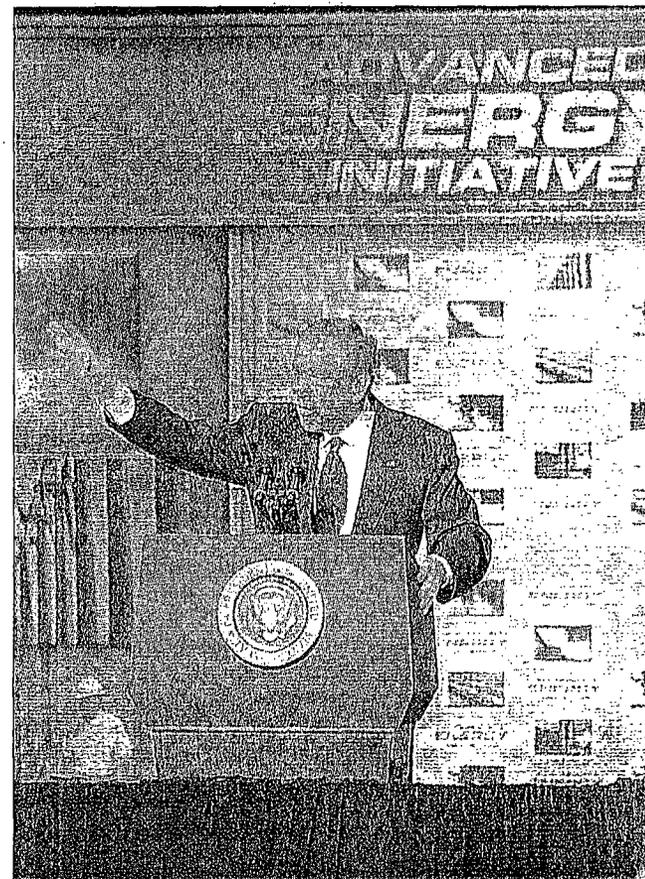
while it's unfortunate that we have a place with this stuff in our back yard, I think everyone has to come to the realization that it's not going anywhere," Cuthbert said.

"I think we need to make that project at Limerick safer, which is why I'm so concerned about Exelon refusing Pottstown's request for additional monitoring, and I think we need to stop making more of this waste," said Cuthbert.

She was referring to the push by President Bush to build new nuclear plants, an initiative he reiterated when he visited the Limerick plant in May.

The NRC has already begun to plan for more applications by adding funds to its budget to review those applications.

"There is more than enough wind and solar power available to make all the electricity we need and we can stop making this horrible waste that will be a threat for thousands of years," said Cuthbert.



Daniel P. Creighton/The Mercury
President Bush speaks at the Exelon Nuclear Limerick Generating Station in May. The "temporary" storage of high radioactive spent nuclear fuel rods at Exelon Nuclear's Limerick Generating Station could become permanent, at least as far as the new Democratic leader of the U.S. Senate is concerned.

EPA sets a million-year health standard for nuclear dump

10-1-08 PI

By H. Josef Hebert
ASSOCIATED PRESS

WASHINGTON — No one knows what Earth will be like in a million years. But a proposed nuclear-waste dump in Nevada must be designed to ensure people living near the site a million years from now are exposed to no more than 100 millirems of radiation a year. And over the next 10,000

years, radiation exposure to the waste dump's neighbors may be no more than 15 millirems a year, or about what people get from an X-ray. People get about 350 millirems a year of radiation on average from all background sources.

After three years of deliberations, the Environmental Protection Agency yesterday announced its radiation

health standard for the proposed Yucca Mountain nuclear-waste repository, a proposed system of underground caverns 90 miles northwest of Las Vegas where the government hopes to keep highly radioactive commercial and military nuclear waste.

It is scheduled to open in 2020 if a license application is approved by the Nuclear Reg-

ulatory Commission.

The EPA has struggled to comply with a 2004 court directive that said it must establish a radiation health standard for a million years into the future because some of the isotopes in the buried waste will remain extremely dangerous for that long. An earlier standard of only 10,000 years was ruled inad-

quate by the court.

The agency said yesterday it believed its latest standard met the recommendations of the National Academy of Sciences and was expected to satisfy the court decision.

The Energy Department in June submitted its license request for the Yucca Mountain dump to the NRC, which has three years to consider the re-

quest. Despite strong opposition from Nevada officials, the Bush administration hopes the site can be opened by 2020.

It is designed to hold 77,700 tons of used reactor fuel from commercial nuclear plants in 31 states. The Energy Department has estimated a cost of \$96.2 billion of building and operating it for 150 years.

simply has too much waste. I believe @ one time they inquired about using either SD, ND or Neb as a federal depository. How nice would that be, we'd get to store the rest of the nations nuclear waste. Nuclear power isn't the big deal here, its the waste that is the problem.

Here's a list of the toxic chemicals in spent nuclear fuel and their 1/2 lifes.

Hydrogen-3 (tritium) 12 years
 Beryllium-10 1 million 600 thousand years
 Carbon-14 5 thousand 700 years
 Silicon-32 500 years
 Phosphorus-32 14 days
 Potassium-40 1 thousand million years
 Calcium-42 14 thousand years
 Iron-55 3 years
 Cobalt-60 5 years
 Nickel-59 75 thousand years
 Nickel-63 10 years
 Selenium-79 65 thousand years
 Krypton-81 200 thousand years
 Krypton-83 10 years
 Rubidium-87 47 thousand million years
 Strontium-90 29 years
 Yttrium-90 2 days
 Zirconium-93 1 million 500 thousand years
 Niobium-93m 14 years
 Niobium-94 20 thousand years
 Molybdenum-93 3 thousand 500 years
 Technetium-99 200 thousand years
 Ruthenium-106 1 year
 → Palladium-107 6 million 500 thousand years
 Cadmium-113m 14 years
 Tin-126 100 thousand years
 Antimony-125 3 years
 Antimony-126 12 days
 Tellurium-125m 58 days
 → Iodine-129 15 million 700 thousand years
 Cesium-134 2 years
 Cesium-135 2 million 300 thousand years
 Cesium-137 30 years
 Cerium-144 3 hundred days
 Promethium-147 3 years
 Europium-154 9 years
 Europium-155 5 years
 Hafnium-182 9 million years
 Tantalum-182 1 hundred days
 Rhenium-187 50 thousand million years
 → Lead-205 14 million 300 thousand years
 Lead-210 22 years
 Bismuth-208 400 thousand years
 Bismuth-210 5 days
 Bismuth-210m 3 million years
 Polonium-210 138 days
 Radon-222 4 days
 Radon-223 11 days
 Radium-224 37 days
 Radium-225 14 days
 Radium-226 1 thousand 600 years
 Radium-228 6 years
 Actinium-225 10 days



LOCAL

Pottstown wants more monitoring at nuclear plant

By Evan Brandt
ebrandt@pottsmmerc.com

POTTSTOWN — The borough's environmental advisory council is taking another run at Exelon, trying to get the company to install additional monitoring at the dry cask spent fuel storage facility it will soon erect at the Limerick nuclear plant.

According to a draft of a letter to plant manager Christopher Mudrick, Pottstown intends to ask that constant, real-time temperature monitoring be conducted at the cask site.

On Nov. 16, Mudrick rebuffed a September request by Pottstown that additional, real-time radiation monitors be placed around the dry casks to provide extra protection in the event of a release of radiation.

Mudrick wrote that the radiation monitors are "in place" and checked routinely by plant personnel, but the information on the monitors would not be routed to a "central control center" as Pottstown had requested.

Now the borough is making the same request, but this time for temperature monitoring.

During presentations Exelon made on its dry cask plans, "emphasis was placed on the fact that the casks are kept sufficiently cool by the passive air flow through the facilities housing the casks," the letter reads.

"The presentation also indicated that the warming of the temperatures outside the cask could be an indication of problems within the cask," the letter continues. "Since a fluctuation in the external temperatures could be an indication of two possible issues, we do not understand

why constant monitoring of the temperature would not be deemed to be just as important as constant monitoring for radiation."

Added the letter, "we believe that the cost of such a system would be relatively modest."

Elizabeth Rapczynski, a spokeswoman for Exelon, said she could not comment on a letter the company has not yet officially received.

Pottstown Borough Council voted unanimously Jan. 8 to send the letter once it has been reviewed by Borough Solicitor Charles D. Garner Jr. and Borough Manager Ray Lopez.

The dry cask storage casks are being erected at the Limerick plant because the spent fuel pool located inside the reactor building is reaching its capacity.

The casks are officially considered a temporary solution until the nation's spent fuel reposi-

tory beneath Nevada's Yucca Mountain is completed.

However, one by-product of the Democratic take-over of Congress in November was installation of Yucca Mountain opponent, Sen. Harry Reid of Nevada, as the new Senate Majority Leader.

That, and the fact the project is embroiled in financial and scientific controversy, has many to note that the dry casks should be considered as permanent installations since they may well reflect the reality of the situation.

That is a view strongly disputed by the nuclear industry, which points out that the federal government has a legal and contractual obligation to take possession of the spent fuel — which remains radioactive for centuries — as well as responsibility for its permanent storage.

The Mercury

A8 / Friday, December 22, 2006



READERS' VIEWS

Focus on deadly waste at Limerick

If Limerick Nuclear Power Plant has an accident involving its high level radioactive wastes or if it were breached through terrorist attack, the health, environment and economic consequences could be catastrophic. Our focus should be on addressing immediate and long-term threats from this deadly waste at Limerick, in the safest, most precautionary and most hardened on-site storage possible.

Exelon is likely to choose the cheapest options, not the safest, unless required by law to improve safety measures. Exelon's failure to supply back-up power for warning sirens and failure to protect against air strikes or missile attacks by terrorists shows their disregard for public health and safety.

NRC cannot be relied upon to do the right thing either. NRC decisions and policies protect the financial interests of the nuclear industry, not public health and safety. The only way that will change is if our federal officials require NRC to protect our interests.

There's no safe solution for storing Limerick's deadly waste. We don't believe Yucca Mountain will, or should, ever open. Centralized interim

storage in Pennsylvania would increase transport risks to public health, safety, and security. Every time Limerick's deadly waste is moved our risk of a catastrophe increases. Comparing Limerick's fuel pools to above ground storage is a false argument. We can expect to always live with both.

However, there is something you can do to attempt to reduce our risk of a Limerick disaster.

Contact your U.S. Senators and Congressmen today. Ask them to support the "Principles for Safeguarding Nuclear Waste at Reactors," developed by national public interest groups.

If implemented, these principles would dramatically increase the safety of high-level radioactive wastes stored at Limerick Nuclear Power Plant and others.

DR. LEWIS CUTHBERT
ACE President

ANOTHER VIEW

The danger of storing nuclear waste

This summer, Limerick Township Supervisors voted to allow Exelon Nuclear to build an outdoor concrete pad so it could move radioactive waste from nearly-full indoor pools to outdoor casks at the Limerick plant. The vote was unanimous, overturning the Township Planning Commission. The mood of the supervisors was casual. Chairman David Kane said voting "no" wasn't an option believing a court would later reverse the decision.

The Democratic victory in November means Harry Reid is now the powerful Majority Leader of the U.S. Senate. Reid is from Nevada, the home of Yucca Mountain, designated to become a permanent repository for nuclear waste. Reid, a long time opponent of the Yucca project, declares it "dead right now," meaning nuclear plants like Limerick are stuck with nuclear waste indefinitely.

**Guest
columnist**

Kane told The Mercury that storing waste at plants like Limerick is a "terrible solution." But he and the other supervisors were deluding themselves this summer if they assumed that Yucca would open any time soon.

Nuclear reactors that made atomic bombs began operating in 1943, and reactors that produce electricity started in 1957. But it wasn't until 1982, when Congress passed the Nuclear Waste Policy Act, that any effort was made to find a site for permanently housing the waste. Without the law, each plant just stored the waste it produced.

After the law was enacted, it took another 20 years for the U.S. Energy Department to examine several possible locations and choose Yucca as the designated site. But long before the November vote and Reid's ascension to power, the Yucca plan was in big trouble. The plan is mired in a variety of legal challenges, and even the most optimistic projection is that it won't be ready until 2018. But the surer bet is that it will never open.

About 77,000 tons of radioactive waste — nearly 1,000 of them at Limerick — is stored at dozens of U.S. nuclear plants. That staggering total equals hundreds of Chernobyls and thousands of Hiroshima bombs. The waste is actually a deadly combination of chemicals produced only when an atomic bomb explodes or a nuclear reactor operates. If these chemicals are ejected into the air, they enter the body and cause cancer, birth defects, and other radiation-related illnesses.

One such chemical is Strontium-90. In the 1960s, mothers protesting atomic bomb tests

(ironically, close to the Yucca site) held signs such as "Please No More Strontium-90," an admission this was one of the more dangerous radioactive chemicals.

The treaty signed by President John F. Kennedy banned above-ground tests. Another chemical is Plutonium-239, which decays very slowly, and will not completely be gone for 240,000 years. So the plan to store waste must be 100 percent foolproof — meaning absolutely no chance that waste will ever escape — for this length of time, or disaster will ensue.

Yucca Mountain is a desolate area about 90 miles northwest of Las Vegas. The Energy Department concluded there was virtually no way to disturb the deadly chemical soup stored far underground. But water seeping through fissures into the site and frequent earthquakes make Yucca unsuitable for waste storage. Moreover, the potential of a terrorist attack makes any site unsuitable.

Opening Yucca would also require that waste would be shipped across the country by trucks, trains, and sometimes barges. Thousands of trips would be made, many through large population centers. The cargo on each trip would be the deadly stew of radioactivity, with 40 to 200 times the radioactivity of the Hiroshima bomb. Any successful terrorist attack or accident would be absolutely disastrous. The term applied to each shipment is "Mobile Chernobyl."

The federal Nuclear Regulatory Commission has approved, or rather rubber-stamped, all 36 applications from companies like Exelon to take the waste from the overloaded pools and move it to outside casks. Limerick Supervisor Renee Chesler commented that citizens can go to elected officials if they have concerns. But Chesler, like Kane, deliberately ignored the realities of nuclear politics.

Kane, Chesler, and the other Limerick supervisors are savvy enough to know that Yucca was going nowhere. They knew there was no solution to the waste problem 50 years ago when nuclear reactors began operating, and there is no solution now. They had the chance this summer to stop Exelon from adding more waste to the already huge amount, but chose to hide their heads in the sand. And with their blessing, Limerick has now been made into a dump for the most dangerous stuff on earth; for the foreseeable future and maybe forever, threatening us, our children, and future generations.

Joseph Mangano is national coordinator of the Radiation and Public Health Project, a research and education group based in New York.



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Pottstown, Pennsylvania

Storage of spent nuclear fuel rods at Limerick plant could become permanent

By Evan Brandt

ebrandt@pottsmmerc.com

POTTSMERICK — The “temporary” storage of highly radioactive spent nuclear fuel rods at Exelon Nuclear’s Limerick Generating Station could become permanent, at least as far as the new Democratic leader of the U.S.

Senate is concerned.

With the November takeover of Congress by the Democrats, opponents of the federal government’s planned spent nuclear fuel storage facility beneath Nevada’s Yucca Mountain gained a powerful new ally.

Harry Reid, the new Senate Majority

Leader, hails from Nevada and told reporters in his home state last week that the much-delayed, over-budget project is “dead right now,” according to reports by The Associated Press.

Originally targeted for opening in 1998, the Energy Department now says the best case scenario for the

opening of the Yucca Mountain facility is 2017.

It is intended to hold 77,000 tons of the radioactive spent fuel left over after it has been used to boil water in the nation’s nuclear reactors. About 50,000 tons of that fuel is now stored in dry casks at 65 power plants in 31

states, according to the Associated Press.

One of those plants is in Limerick.

In July, Limerick’s Board of Supervisors approved the land development plans for the Exelon plant to install a concrete pad on which its own

(See FUEL ROD STORAGE on A6)

Storage of spent nuclear fuel rods at Limerick plant could become permanent

FUEL ROD STORAGE from A1)

dry cask storage facility will be erected.

During meetings on those subjects, officials with Exelon and the Nuclear Regulatory Commission insisted the dry casks are only needed for temporary storage and that the fuel will be moved to Yucca Mountain when it opens.

But Reid told reporters that not only would he refuse to allow any bill that helps the Yucca project to reach the Senate floor during his tenure over the next two years, but also that funding for the project may dry up quickly.

Reid also said that keeping the fuel in dry cask storage at the nation's nuclear power plants will keep it safe for 100 years.

That's not cutting it for Edward F. Sproat, director of the Energy Department's Office of Civilian Radioactive Waste Management. He told The Associated Press "leaving everything where it is, is not a solution to the problem."

Leaving the fuel stored at the plants is just "pushing the solution off to future generations," Sproat said.

But don't count Limerick supervisors' Chairman David Kane among those overly concerned by Reid's statements.

"I don't believe the decision is his to make," Kane said of Reid's pledge to oppose the Yucca Mountain project, adding he is "not surprised" that Reid has taken that position.

He called the idea of leaving the fuel at individual power plants, Limerick included, "a terrible solution" and added "I'm confident the federal government will continue to pursue the best possible solution."

Kane added that the township would continue to "be aware and monitor the situation."

Asked about Reid's comments, Beth Rapczynski, a spokeswoman for Exelon, said, "It's important to keep in mind that the federal government has an obligation under the law to

build a central repository for used nuclear fuel, which was mandated by Congress in the Nuclear Waste Policy Act of 1983.

"Since then, consumers of nuclear-generated electricity have paid more than \$25 billion into the Nuclear Waste Fund for that purpose," Rapczynski said.

"While we believe dry cask storage is a safe interim solution, we continue to fully support Yucca Mountain as the long-term storage solution for used nuclear fuel," she said.

Donna Cuthbert, vice president of the Alliance for a Clean Environment, does not support Yucca Mountain and lauded Reid's stand in the issue.

"The more I've studied this issue, the more I've come to realize the removal and transport of this deadly waste is as much or more of a threat than keeping it where it is now," Cuthbert said. "I commend Sen. Reid for taking a thoughtful approach to this."

"Yucca is a scientifically unsafe place to put this fuel and

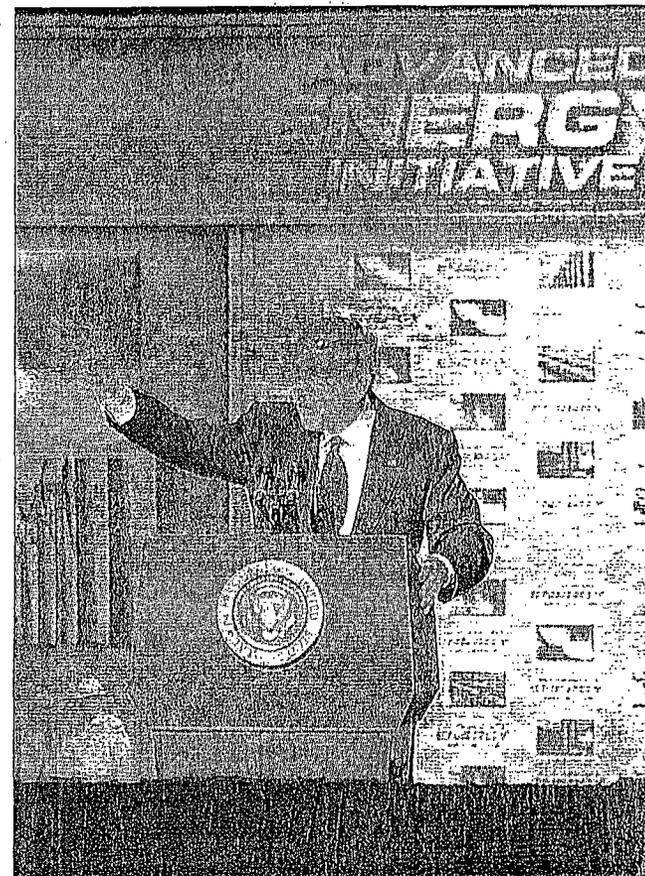
while it's unfortunate that we have a place with this stuff in our back yard, I think everyone has to come to the realization that it's not going anywhere," Cuthbert said.

"I think we need to make that project at Limerick safer, which is why I'm so concerned about Exelon refusing Pottstown's request for additional monitoring, and I think we need to stop making more of this waste," said Cuthbert.

She was referring to the push by President Bush to build new nuclear plants, an initiative he reiterated when he visited the Limerick plant in May.

The NRC has already begun to plan for more applications by adding funds to its budget to review those applications.

"There is more than enough wind and solar power available to make all the electricity we need and we can stop making this horrible waste that will be a threat for thousands of years," said Cuthbert.



Daniel P. Creighton/The Mercury
President Bush speaks at the Exelon Nuclear Limerick Generating Station in May. The "temporary" storage of highly radioactive spent nuclear fuel rods at Exelon Nuclear's Limerick Generating Station could become permanent, at least as far as the new Democratic leader of the U.S. Senate is concerned.

Nuclear waste dump faces new roadblocks in Democratic Congress

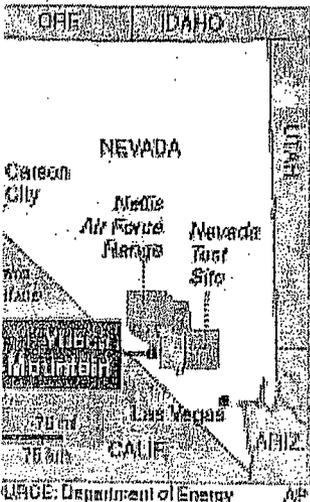
By Erica Werner
Associated Press Writer

WASHINGTON — When Congress targeted Nevada as the nation's nuclear waste dumping ground, the state didn't have the political power to say no.

Twenty years later, the most potent foe of the Yucca Mountain nuclear waste dump about to become Senate majority leader. Nevada Democratic Sen. Harry Reid's new job, which gives him control over what legislation reaches the Senate floor, could deal a

Nuclear dump site

Yucca Mountain — planned as the first national repository for radioactive waste — could face new roadblocks from the newly elected Democratic Congress.



crippling blow to the already stumbling project.

Among Reid's first acts after this month's election was to convene a conference call with home-state reporters to declare Yucca Mountain "dead right now."

"It sure is different now than when I came (to the Senate) in 1986," the senator observed.

The dump 90 miles northwest of Las Vegas is planned as the first national repository for radioactive waste. It's supposed to hold 77,000 tons of the material — from commercial power plants reactors and defense sites across the nation — for thousands of years. About 50,000 tons of the waste is now stored in temporary sites at 65 power plants in 31 states. Reid would leave all of it in place.

Originally targeted to open in 1998, Yucca Mountain has been repeatedly set back by lawsuits, money shortfalls and scientific controversies. The Energy Department's best-case opening date is now 2017.

The effort to create a national storage site has already cost about \$9 billion, \$6.5 billion of which has been spent on Yucca. Four years ago, the Energy Department estimated the project would cost \$58 billion to build and operate for the first 100 years. New cost projections are being worked up, and they are expected to total more than \$70 billion.



AP Photo
Senate Minority Leader Sen. Harry Reid, D-Nev., left, is joined by Sen. Richard Durbin, D-Ill., and Sen. Byron Dorgan, D-N.D., during a news conference on Capitol Hill in Washington in this file photo. Reid's new job, which gives him control over what legislation reaches the Senate floor, could deal a crippling blow to the Yucca Mountain nuclear waste dump.

The department proposed legislation earlier this year meant to fix problems with the dump, which is a mounting liability to taxpayers because the government was contractually obligated to take nuclear waste off utilities' hands starting in 1998. Energy Department officials say at least one legislative change — formally withdrawing land around the dump site — is needed before construction can begin.

Reid, however, pledged after the Nov. 7 election that not only will no bill to help Yucca

Mountain reach the Senate floor under his leadership, funding for the project also will dry up quickly. Annual spending on the dump that has ranged between \$450 million and \$550 million in recent years "will be cut back significantly, that will be for sure," he vowed.

Reid said he couldn't single-handedly kill the dump outright, something that would require a vote of Congress and approval by President Bush. But he added: "There's not much to kill."

The project also is losing some of its most persistent sup-

porters as Republicans relinquish control of Congress. Senate Energy Committee Chairman Pete Domenici, R-N.M., has been a vocal advocate for years; he'll be replaced by Sen. Jeff Bingaman, D-N.M., who supports Yucca Mountain but is viewed by Nevada officials as more open to their viewpoints.

Sen. Barbara Boxer, D-Calif., who will chair the Environment and Public Works Committee with authority over some aspects of the project, is a vocal Yucca Mountain opponent. Incoming House Speaker Nancy Pelosi, D-Calif., worked unsuccessfully to corral opposition to the project in a crucial House vote four years ago, when she was minority whip.

Administration and industry officials insist the changing of the guard on Capitol Hill won't be the death knell for the project. About 1,500 people in Nevada are now employed there.

Yucca Mountain also has lured research grants to the University of Nevada, and even Reid aides say some spending should be maintained.

"I don't think the program's gone off the edge by any means," said David Blee, executive director the U.S. Transport Council, an industry group that works on nuclear waste transportation. "It'll be more complicated and take a more creative approach, and more of an

approach outside the (Washington) beltway."

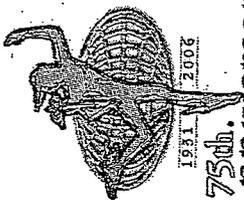
Supporters say they will now focus on submitting a required license application to the Nuclear Regulatory Commission. The Energy Department wants to do that in 2008 and it's not dependent on congressional action, though severe budget cuts would be an impediment.

Reid says putting the highly radioactive wastes in dry storage casks at power plants will keep it safe for 100 years or more. To industry officials and the Energy Department, that's no answer.

"Leaving everything where it is, is not a solution to the problem," said Edward F. "Ward" Sproat, director of the department's Office of Civilian Radioactive Waste Management.

Failure to pursue the Yucca project, Sproat said, "is pushing the solution off to future generations, which is pretty much what's been happening with this program up until now."

On the Net:
State of Nevada Agency for Nuclear Projects:
www.state.nv.us/nucwaste/
Energy Department Office of Civilian Radioactive Waste Management:
www.ocrwm.doe.gov/
Sen. Harry Reid:
reid.senate.gov/



The Mercury

Monday, November 20, 2006

www.pottsmmerc.com

Pottstown, Pennsylvania

Exelon says no to extra monitors

By Evan Brandt
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LIMERICK – Two months after Pottstown asked Exelon Nuclear to install additional heat and radiation monitoring for its proposed spent fuel storage facility, the borough has received Exelon's answer – no.

In a Nov. 16 response to the borough, plant manager Chris Mudrick wrote, "We agree with much of the report," but went on to say that the centrally controlled monitoring requested will not be installed. He was referring to a report from the Pottstown Environmental Advisory Commission that was adopted by the Borough Council on Sept. 11.

At the time of its adoption, the fifth anniversary of the terrorist attacks on the World Trade Center and the Pentagon, EAC Chairman Don Read pledged that the EAC would press Exelon on the subject of how the new project at the site would be protected from a terrorist attack. That conversation has not yet occurred and, as a result of Mudrick's response, may never occur.

Read said the EAC first wanted to make this monitoring request of Exelon as a trial balloon "to see how productive these discussions would actually be."

The central change the EAC asked for was "in-place detection devices with the information relayed to a central control center."

In Exelon's reply, Mudrick wrote that the company will use the same kind of "in-place" monitoring devices as it already has "placed

(See DETECTION DEVICES on A5)

Exelon: No extra monitors

(DETECTION DEVICES from A1)

strategically in the plant, on our personnel and in various locations throughout the 10-mile emergency planning zone." Those devices are badges called thermo luminescence dosimeters.

"We will not, however, have the monitoring relayed to a 'central control center,' as mentioned in the EAC report," Mudrick wrote. The reason why not that he gave: "a central control center is not part of the Transnuclear Nuhoms system's licensed design."

The fact that the system Exelon purchased is licensed by the federal Nuclear Regulatory Commission meant that Exelon did not need to pursue its own site-specific NRC license for the project.

The project calls for moving spent radioactive fuel rods, stored in a 30-foot pool of water since the plant first began operation, to steel and concrete casks that will be placed outside the reactor building but within the plant's protected perimeter.

"The system we have purchased is passive, meaning that no electricity or active parts are needed to cool the casks," Mudrick wrote in explaining why no central control center or wiring would be added. "This passivity is a safety design feature, ensuring that no parts can fail to stop cooling."

Read said he didn't find Exelon's response "very useful at all. They're not really doing anything in this, other than explaining things we already knew they were doing."

"What you have here is a very carefully prepared statement that took them two months to craft which, in two minutes, anyone reading it can tell boils down to them telling us they won't give us the one extra layer of protection we asked for," said Read.

"Maybe they're afraid they'll set a precedent and communities around the four other plants where Exelon has dry cask storage facilities will want monitoring like that, too. I don't know," he said.

"Bottom line is, I don't see where it's much use talking to them about the terrorist issue, or anything else further, because it seems to be a one-way conversation," said Read. "We ask for something beyond what the regulations require them to do and they say no."



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Wednesday, September 13, 2006

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The Mercury

Pottstown, Pennsylvania

Environmental council to push Exelon on nuclear plant security

By Evan Brandt

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POTTSTOWN — Speaking on the fifth anniversary of the Sept. 11 terrorist attacks, a borough official pledged Monday to press Exelon Nuclear more closely about how it plans to prepare the defense of its latest project at the Limerick plant against an attack by terrorists.

On Monday night, Pottstown Borough Council adopted the recommendations of its Environmental Advisory Commission, which ask

Exelon Nuclear to install additional radiation and temperature monitoring when it erects its dry cask storage system for its radioactive spent fuel rods.

The project, approved by Limerick Township in July, will allow the excess fuel rods now stored inside the generator building into steel and concrete casks located on a concrete pad outside the generator building but within Exelon's defended perimeter.

Don Read, who is the chairman of the EAC, told council this is just the first of a series of recommendations the group expects to make to Exelon.

Noting that Exelon had asked in March to meet with the EAC and asked for input on its controversial project, Read described the recommendation for additional monitoring as a trial balloon.

"We picked an easy issue to see how productive these discussions would actually be," Read told Borough Council Monday.

"We have other, more complicated issues we would like to address," said Read.

"And I suppose it's ironic that we're standing here on the fifth anniversary

of the terrorist attacks and I'm telling you we're going to ask Exelon whether the possibility of a terrorist attack has been considered in their plans," Read said.

Elizabeth Rapczynski, director of communications for the plant, said after the meeting the spent fuel will be stored "within a secure area and the casks are designed and constructed with all man-made and natural threats in mind."

"I realize that attacks like those on Sept. 11 are hard to defend against, but (See NUCLEAR PLANT SECURITY on A7)

Environmental council to push Exelon on nuclear plant security

(NUCLEAR PLANT SECURITY from A1)

can we at least look at that?" said Read.

In the wake of the attacks in 2001, National Guard troops were called out to provide additional security at nuclear power plants all across the country, including the Limerick Generating Station, and were stationed there for weeks.

Since then, the Nuclear Regulatory Commission has required nuclear plants to provide increased security. At Limerick, much of that is provided by a private firm, Wackenhut Security.

More recently, a federal court in California ruled that the Diablo Canyon nuclear plant must consider the possibility of a terrorist attack in its environmental impact statement for a dry cask spent fuel storage depot.

That case differs slightly from Limerick's project because the California case involves a "site specific" license from the Nuclear Regulatory Commission.

The Limerick project is permitted by the NRC because the company that manufactures and erects the casks, Transnuclear Inc., holds a "general license" for the product.

Nevertheless, Read said, the EAC is waiting to see how that case is interpreted by the NRC, in addition to gauging Exelon's response to its first request, before assembling comments on the terrorism issue.

"We're trying to take baby steps here," said Read.

However, at least two councilmen were not sure they were ready to take even those small steps.

"In fairness to Exelon, they haven't even been given a copy of the report," said Councilman James Vlahos. "They haven't had an opportunity to comment on this."

Councilman Greg Berry said, "If the EAC is potentially going to have multiple concerns, why not wait until they're all together so as not to waste anyone's time?"

However, when it was explained that council's vote was merely forwarding those recommendations to Exelon, and they would be free to comment or act on them as they saw

Last week, Read told the council that he wished more surrounding towns would speak up and take a position on the nuclear plant's project.

fit, the matter was adopted unanimously by the council.

Currently, Exelon plans to monitor temperature and radiation near the casks on a regular basis by way of readings taken by a person with a hand-held monitor.

The EAC, and now Borough Council, have asked that continuous, real-time monitoring be implemented.

"The director of communications for Exelon is here and I feel sure she will relay to them that council feels very strongly that we would like to see additional monitoring," said Borough Council President Jack Wolf.

Read praised Exelon's employees as "professionals" and said "the plant is really one big back-up system. They have considered every contingency they can think of and we're just trying to perpetuate that thinking into the dry cask storage project with redundant monitoring."

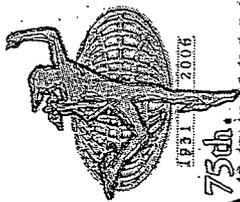
He added, "We are not starting a jihad against Exelon. I'm hoping we can develop a long-term relationship with Exelon and not just to get them past this project. We want to work with them."

"We look forward to reviewing the EAC's report," Rapczynski said after Monday's meeting.

Read also addressed criticism that Pottstown is "sticking its nose into another town's business."

Last week, he told the council that he wished more surrounding towns would speak up and take a position on the nuclear plant's project.

Holding up an Exelon map showing the 10-mile radius surrounding the plant, Read said simply, "We're in the evacuation zone. That's all I need to say."



The Mercury

Monday, August 7, 2006

www.pottsmmerc.com

Pottstown, Pennsylvania

Maker of fuel rod storage casks cited

NRC officials say manufacturer didn't measure thickness

By Evan Brandt
ebrandt@pottsmmerc.com

LIMERICK — The maker of the casks that will hold spent fuel from the Limerick Nuclear Generating Station was cited last month for violating a manufacturing procedure.

During June inspections at two manufacturing locations in Japan, Kobe Steel Ltd. and Hitachi Zosen Mechanical Corp., inspectors for the Nuclear Regulatory Agency found a violation — the failure to adequately measure the thickness of casks being manufactured there.

The casks, in question are not those destined for Limerick, said NRC spokesman Neil Sheehan. “They haven’t even started working on the Limerick casks yet,” he said.

The two Japanese manufacturers have been contracted by Columbia, Md.-based Transnuclear Inc., a subsidiary of the French company Areva, to build the casks. Transnuclear holds the license from the NRC for its NUHOMS cask system, which is the one that will be used at Limerick.

Sheehan said the violation is a “level four violation,” the lowest issued by the NRC. There are no fines involved as of yet.

In a July 10 letter to Transnuclear President and CEO Tara Neider, NRC official Robert J. Lewis wrote that the company must respond to the violation and the response would be used “to determine whether further enforcement action is necessary.”

Neider said Friday the violation notice “had no impact on product quality.”

She said other than the paperwork issue for which the violation was received, “the NRC lead auditor said

(See STORAGE CASKS on A3)



LOCAL

Maker of fuel rod storage casks for Limerick cited

STORAGE CASKS from A1

ve were otherwise in compliance with NRC regulations and the quality of the construction is excellent.”

Beth Rapczynski, spokeswoman for Exelon, e-mailed the following statement after The Mercury forwarded a copy of the NRC notice to their offices Tuesday: “We were aware that Transnuclear was putting corrective actions into their processes surrounding the testing of thickness of steel, but we were not aware on Tuesday that it was going to be considered a notice of violation.

“That is because a notice of violation is between Transnuclear (the licensee) and the NRC (the regulator.

Transnuclear has fully briefed us on this issue and we are confident they are making the changes and improvements necessary to deliver us a quality, safe product,” Rapczynski wrote.

Despite these reassurances, David Kane, chairman of the Limerick Board of Supervisors, called the news of the violation “troubling.”

“Any time there is a violation with anything that has to do with those casks, it is a major concern to Limerick Township,” Kane said.

“We intend to contact NRC and Exelon and ask for a full explanation,” he said. “We need to be sure there aren’t any more mistakes and that the rest of this project is mistake-free.”

The thickness of the casks is impor-

tant because it is the first shield against the radiation and 400-degree heat the spent fuel will generate for years. The steel casks will rest inside a pre-cast concrete housing, the inside of which will be air-cooled through vents in the concrete.

Sheehan said the violation notice does not necessarily mean that the thickness inspection did not take place, only that it was not properly documented as NRC rules require.

Neider said the thickness inspections were done and were documented. “It was just that the documentation that was done was inconsistent with what they are supposed to write down.”

She said “corrective measures” have already taken place at the Hitachi

Zosen Mechanical Corp. yard where the violation occurred. She said that yard will play a part in the construction of the Limerick casks.

“They do good work for us there,” said Neider.

The NRC inspection report notes that while construction on the casks for Limerick has not yet begun, “planning and material procurement is under way.”

The same is true of the “transfer cask” which will be used over and over to transfer the radioactive spent fuel from the 45-foot pool of water in which it now rests to the “dry casks,” to be located outside the reactor building.

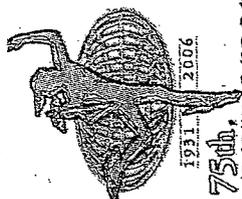
The approval to build the concrete pad on which those outdoor casks will

rest was issued July 27 by the Limerick Board of Supervisors.

The approval was not an endorsement of the project, Kane has insisted several times. It was merely a land development approval which the board could not deny, due to the fact that Exelon Nuclear, the company that owns and operates the plant, had met all the legal requirements, he said.

Some residents and a local environmental advocacy group have pushed for further precautions to be taken, particularly against a terrorist attack, but the NRC has made no change in its regulations.

Exelon maintains it will follow NRC regulations.



The Mercury

75th Anniversary

Thursday, June 22, 2006

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Pottstown, Pennsylvania

Court ruling could affect local nuke project

By Evan Brandt
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LIMERICK — A federal court decision regarding the possibility of a terrorist attack on radioactive fuel stored at a California nuclear power plant could have an impact on a similar proposal here.

When Exelón Nuclear announced plans to store spent nuclear fuel rods in casks on the grounds of its Limerick Nuclear Generating Station, the Alliance for a Clean Environment raised some concerns.

High on its list was the possibility of a terrorist attack.

Among its suggestions for dealing with those concerns was fortifying the casks in bunkers, or scattering the casks around the site so they would not present one single target.

Apparently they were not alone.

For when Pacific Gas and Electric Co. announced its plans to store spent nuclear fuel rods in casks on the grounds of its Diablo Canyon nuclear generating station, a similar California group raised the same concerns.

The difference is that the California Group, Mothers for Peace, went to federal court. And, joined by the California Attorney General, they won.

In a 3-0 decision earlier this month, the Ninth U.S. Circuit Court of Appeals in San Francisco set aside the permit granted Diablo Canyon by the Nuclear Regulatory Commission.

(See SPENT FUEL RODS on A3)



Court ruling could affect local nuclear project

(SPENT FUEL RODS from A1)

The court said the NRC's argument that the threat of a terrorist attack was too remote to include in environmental planning, was undermined by the Bush administration's post-Sept. 11 statements and actions about the terrorist threat against those self-same plants, the San Francisco Chronicle reported.

According to the Los Angeles Times, the appeals court concluded it was unreasonable for the NRC to declare that "the possibility of a terrorist attack ... is speculative ..." at the same time the government is spending time, effort and taxpayer money to combat the threat of terrorist attacks on nuclear power plants.

"The terrorist attacks of Sept. 11, 2001 have removed any shred of credibility from the NRC's stance that terrorist attacks on nuclear facilities are 'speculative' events that cannot be predicted," Diane Curran, the Washington, D.C., attorney representing Mothers for Peace, said in her oral argument in October, according to the Los Angeles Times.

"The ruling could have a very important impact' on other licensing decisions around the country, Edwin Lyman, a physicist and senior staff scientist at the Union of Concerned Scientists in Washington told the paper.

But whether that will prove true in Limerick remains unknown.

Beth Rapczynski, a spokesperson for Exelon, said her company's lawyers are "aware of the case and have read through the ruling."

She said the company "works hard to ensure all our projects meet NRC regulations and if the NRC chooses to change its regulations regarding this issue, we will, of course, comply."

Whether the NRC will change its regulations is, currently, another unknown.

Diane Screnci, a spokesperson for the NRC's King of Prussia office, said Wednesday the agency is reviewing the decision and has no comment at this time.

And should the NRC decide to alter its regulations as they apply to the Diablo Canyon site, it's possible that would still have no impact on the Limerick project.

That's because the NRC licenses spent nuclear fuel storage in two ways.

One license is specific to the site, as was the case in California.

The other method licenses the provider of casks. Called a "general license," this is the case in Limerick, which has hired Transnuclear Inc. to install its casks.

Even if the NRC decides not to appeal this most recent court decision, don't be surprised if it argues the decision does not apply to the Limerick storage site because of the difference between the types of permit, said

Rochelle Becker.

One of the original "Mothers for Peace" and now with the California-based Alliance for Nuclear Responsibility, Becker said, "You should expect the NRC to try and wriggle out of anything they are supposed to do. That is their pattern."

In fact, Becker said she became so disgusted after dealing with the NRC that she changed her tactics and joined a group that argues the storage of nuclear fuel is a "states rights" issue and helped to craft a state law regulating radioactive waste now making its way through the California legislature.

Referring to the possibility of splitting the hair between a site-specific license and a general license, Becker said, "The most ridiculous thing about their argument is that a terrorist doesn't care about what kind of permit you have when choosing where to attack. The NRC has just refused to deal with this issue everywhere in the country and until they do, everyone's at risk."

And that's why, said ACE Vice President Donna Cuthbert, Exelon must be prevailed upon to install the most protective possible measures for the storage of its Limerick fuel.

"This is not just about Limerick and this is not just about our future," Cuthbert said.

"The decisions we're making today could have an impact on our grandchildren's grandchildren. Everyone who has these casks in their backyard should be asking the NRC these same questions," Cuthbert said.

She said she has already sent a letter to the NRC about her concerns and recently sent letters to the members of the Limerick Planning Commission and the Limerick Board of Supervisors, urging them to do the same.

Because its contractor has a general license, the only government permissions the power plant needs to begin construction on its storage project is local land development approval.

But that isn't going as smoothly as it might.

Last week, the Limerick planners had some questions of their own for Exelon officials, but they went unanswered. Citing security concerns, Exelon officials declined to provide information on their drawings for issues ranging from where current facilities are located to calculations for stormwater management.

So, according to Township Solicitor Joseph McGrory, the planning commission had little choice but to unanimously reject Exelon's application.

However, the planning commission is strictly a recommending body under Pennsylvania state law, and the final decision rests with the township supervisors.

According to the township Web site, the supervisors meeting is tonight at 7 p.m.



READERS' VIEWS

Nuclear waste poses a danger

Limerick Nuclear Power Plant's high-level radioactive waste storage threatens the safety of every person reading this newspaper. As long as Limerick continues to operate, high-level radioactive waste (that can remain radioactive for hundreds of thousands of years) will keep piling up in our backyard. It will outlive any container storing it. Most of this deadly waste will remain here forever, leaving future generations with a lethal legacy.

Limerick's fuel pools already hold enough high level radioactive waste to create a disaster worse than Hiroshima. Above-ground cask storage is not instead of fuel pools at Limerick, it is in addition.

Fuel rods are far more radioactive after use. To call it "spent fuel" is deceptive. The only thing "spent" is our money as ratepayers and taxpayers, and our patience as concerned citizens subjected to this deadly threat by the nuclear industry and their regulators. Ten years after removal from the reactor, the radiation dose one meter away exceeds 10,000 REMS per hour. A dose of 5,000 REMS would be expected to cause immediate incapacitation and death within one week.

Still, the Nuclear Regulatory Commission failed to address concerns of a nuclear engineer about specific design flaws. The NRC appears more interested in protecting Exelon's interests than public health and safety. The NRC's lax oversight and enforcement of violations is alarming. There has been a dismal record of cask accidents and incidents in the brief 20 years casks were in use.

Deadly radioactive waste stored above ground creates another, possibly more inviting terrorist target at Limerick Nuclear Plant in the middle of this heavily populated region. Still the NRC refuses to address or improve security against missiles or air strikes even though army testing proved these casks can be penetrated with missiles. There's an airport within one mile of Limerick Nuclear Plant and another within five miles. Mothers For Peace won against the NRC in a California court concerning the NRC's fail-

ure to address terrorism and casks. We need and deserve the same scrutiny.

Unless required, Exelon won't improve security against missile and air strikes or upgrade the cask design. Unfortunately, the NRC is serving their corporate master and acting as a salesman rather than a regulator.

The NRC convinced the Limerick supervisors that they had no power to deceive the public about threats to health and safety. Sadly, permitting is splintered to such a degree that supervisors approved a cement slab to hold the most lethal waste known to mankind, without even knowing the thickness or how the fault line could impact it. Limerick supervisors are mandated by law to protect the health, safety, and welfare of local citizens. I believe they failed to do that when they treated Exelon's proposal like any other land use issue and ignored the fact that large amounts of high-level radioactive waste were being placed above ground, perhaps permanently.

Clearly, there won't be improved cask design or security without public involvement. Please take action today:

1. Contact Senators Specter and Santorum, and Congressmen Gerlach and Dent.
2. Ask for a comprehensive Environmental Impact Statement (EIS) for Limerick Nuclear Power Plant to include terrorism using current population and financial data.
3. Ask for a public hearing for all in the region, prior to Limerick's use of casks.
4. Contact Limerick supervisors and urge them to defer or reject any land use permits, at least until an EIS is completed and a public hearing is held.

DONNA CUTHBERT
Pottstown

The Mercury

A6 / Sunday, August 13, 2006



READERS' VIEWS

Who's keeping the public safe?

It appears the Limerick supervisors were either misled or bullied by Exelon and NRC, at our expense. One supervisor was quoted saying, "both Exelon and NRC have proven track records." Apparently she spent little time fact finding in the public's interest. Neither track record should be relied on for preventing a Limerick Nuclear Power Plant disaster.

Limerick's chairman said, "We have no control over safety issues." Why would Limerick supervisors allow themselves to be convinced they had no power? They were clearly the only people in the region with any say about this deadly threat. Were they easily deceived into giving up that power or did they simply want to quickly rid themselves of enormous responsibility?

Isn't it the duty of every local official to protect the health, safety and welfare of those who elected them? Isn't it the duty of caring human beings to do whatever it takes to provide the utmost precaution when it comes to increased threats from a nuclear accidental disaster or terrorist attack? This isn't about a concrete pad for a nursery school. It's about storing deadly radioactive waste in our back yard, likely forever.

Limerick supervisors failed this entire region and abandoned the public's interests. They failed to hold off permitting to bargain for security

against air strikes or missile attacks, or insist on minimal increased precaution in cask design planned for Limerick. A few supervisors appear to have recognized the grave threat but blindly expect federal officials to do what they failed to have the courage to do.

Limerick officials told us to contact our federal officials who oversee the Nuclear Regulatory Commission. We'd better do that today before it's too late. Evidence suggests NRC's number one priority is not the public interest.

BILLIE MILLER
Schwenksville

SUNDAY
JULY 23, 2006

The Philadelphia Inquirer

South Jersey Edition c sj

philly.com

Limerick's plans to store nuclear waste raise fears

Steel canisters containing spent fuel would be placed inside concrete vaults that sit out in the open.

By Sandy Bauers
INQUIRER STAFF WRITER

Deep inside the Limerick nuclear power plant — past concrete barriers, razor wire, armed guards, four-inch-thick steel doors, and detectors for explosives and metal — bluish water undulates gently in two deep pools, stirred by pumps.

More than 20 feet below the surface sit 5,000 bundles of spent fuel rods, from Limerick's 20 years of

operation.

And now, the pools are expected to be full in three years.

So Limerick intends to transfer some of the spent fuel — highly radioactive for thousands of years — into steel containers that will be put in concrete vaults sitting in the open on the property.

The plan has alarmed many in the community. They fear that a terrorist attack could rupture a cask and release radiation. They worry that the site will become a permanent nuclear-waste dump.

Critics are outraged that the industry still lacks a good solution to spent fuel a half-century after the first large-scale plant began operat-

See LIMERICK on A13

LIMERICK from A1

g in Shippingport, Pa. But officials for plant owner Exelon Corp. and the Nuclear Regulatory Commission insist it's safe. And they say they have no other options — for Limerick, or any other nuclear plant in the United States.

The contentious debate over what to do with spent fuel may even stall President Bush's plan, promoted during his May 4 visit to Limerick, to build more nuclear power plants.

Roughly 12 to 18 plants are in planning, said Steven Kraft of the industry lobbying group, the Nuclear Energy Institute. But fuel storage "comes up as a concern," he said, and he expects that "visible progress" on a solution will be needed before they get the go-ahead.

John Hanger, president of Citizens for Pennsylvania's Future, an environmental group, put it more bluntly.

"It's the height of irresponsibility," said Hanger, a former member of Pennsylvania's Public Utility Commission. The industry "is out there beating the drums for creating more plants when there is no place to store the waste."

Limerick is merely the latest to move to so-called dry cask storage. Similar facilities have been built — with varying levels of protest — at 33 of 65 commercial nuclear power sites in the nation, including New Jersey's Oyster Creek plant and Pennsylvania's Susquehanna plant in Luzerne County and Peach Bottom in York County. Dry cask storage is nearing completion at Salem and Hope Creek in New Jersey.

This wasn't how it was supposed to be.

When construction began at Limerick in 1974, the plan was to cool the spent fuel in pools, then take it to a reprocessing plant.

But in 1979, President Jimmy Carter banned reprocessing, fearing that a byproduct, pluto-



DAN Z. JOHNSON / Inquirer Suburban Staff

The Limerick nuclear power plant, which is running out of space to store spent fuel rods, wants to move to dry cask storage. Similar facilities have been built at 33 of 65 commercial nuclear power sites in the nation, including New Jersey and Pennsylvania.

onium, which is used in nuclear weapons, would fall into the wrong hands.

In the 1980s, the government decided to take responsibility for the nation's spent fuel.

That led to the Yucca Mountain, Nev., storage plan; the facility was to start accepting deliveries in 1998. But that has hit a multitude of snags, not to mention opposition from Nevada.

On Thursday, the Energy Department's Ward Sproat, director of the Office of Civilian Radioactive Waste Management, told Congress that the earliest Yucca Mountain could open is 2017.

And that "is our best achievable schedule," said Sproat, a Tredyffrin resident and former Peco Energy and Exelon employee who worked at Limerick.

Meanwhile, electricity users across the country have, through their rates, been paying into a Nuclear Waste Fund specifically for Yucca Mountain, which has grown to \$19 billion.

Every March, Limerick shuts down one of its reactors and replaces about one-third of the

fuel, moving the spent fuel into adjacent steel-lined pools.

Officials figure that they have until 2009 before Limerick's pools are filled to a "conservative" limit, said Kevin J. Carrabine, the dry cask project manager. He expects to have the dry storage ready by 2008.

Some residents are angry that, ultimately, they have no say in whether spent fuel is stored in casks on the site. Under Limerick's NRC license, it can store spent fuel. Dry casks are just a different method.

Limerick Township's main purview is whether the thick cement slab that's needed is within setbacks defined by the zoning ordinance and whether it will alter storm-water runoff.

In July, the township supervisors gave the project preliminary approval. Final approval could come by September, Supervisor Renee Chessler said.

Limerick storage plan fuels fears

But at each meeting, dozens of residents show up. In a post-Three Mile Island, post-9/11 world, some worry about radiation.

"You're asking us to put double trouble in our backyard," said Donna Cuthbert, a resident of neighboring North Coventry Township in Chester County. "It's really irresponsible to go down this path."

Limerick is also home to 80 of the plant's 700 workers — and nearly 500 more live within 10 miles.

One of them, Bob Mandik, rose at two recent township meetings and asked other co-workers there to do the same.

"It's not just some outside company that's in here," he said.

Others chafe with long-standing bitterness over the nuclear giant in their midst, township historian Bill Miller said. They didn't want it in the first place, and don't feel adequately compensated for the risks.

In 2005, Exelon won a reduction in the plant's assessed value for taxes from \$912 million to \$20 million. It is now the fourth-largest contributor to the Spring-Ford School District's coffers.

But one of the critics' biggest concerns is terrorism: What would happen if the exposed concrete vaults were targeted?

The NRC has done "extensive modeling," the commission's Randy Hall at a recent township meeting. Its research shows that the casks could withstand an attack "up to and including the crash of a fully loaded jetliner."

Michele Boyd of Public Citizen, a national watchdog group, said other tests showed that the casks could be harmed by a shoulder-fired missile. Her groups favors putting earth berms around the storage site, which a Maine plant has done. Limerick is not planning to do so.

A California antinuclear group, Mothers for Peace, sued the NRC, saying it should have considered the possibility of a terrorist attack at the Diablo Canyon nuclear power plant in San Luis Obispo when it allowed dry cask storage there. In June, a federal appeals court agreed.

Dry cask opponents hope the ruling will prompt closer study of casks at other sites.

Kraft, of the lobbying group, said he thought that if the ruling stood, it would only present "an opportunity for anyone to stop anything."

At best, the casks are viewed as a stopgap solution until Yucca Mountain opens and other proposals — temporary regional storage sites, for instance, or new reprocessing technology — get traction.

David Lochbaum, director of the nuclear safety project for the Union of Concerned Scientists, said that, in some ways, dry cask storage is actually safer than a nearly full pool. If the pool leaks or the pumps and backup pumps fail, the rods could melt or catch fire, releasing a cloud of radiation.

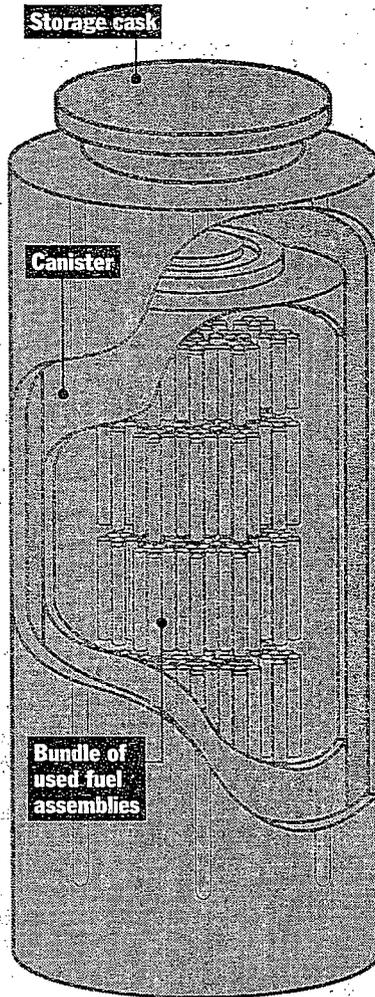
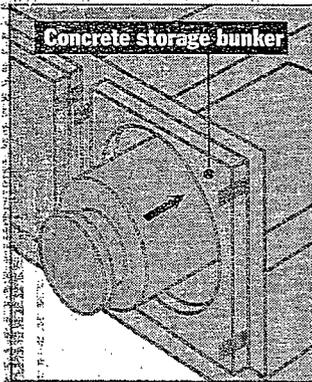
Having an emptier pool would give workers extra hours in which to respond to an emergency, he said.

"There is no zero-risk answer to this problem," he said. "It's managing the risk to as low as you can get."

Contact staff writer Sandy Bauers at 215-854-5147 or sbauers@phillynews.com.

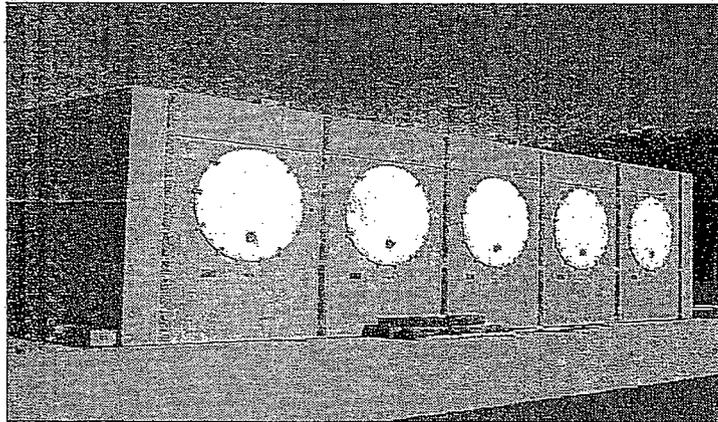
Limerick's Dry Cask Storage

Limerick plans to store its spent nuclear fuel in steel containers that will be put in concrete vaults. In the storage process, spent fuel is cooled in a pool and loaded into a steel canister. After being welded shut, the canister is drained and filled with helium, an inert gas, to prevent corrosion. The 20-foot-tall canister will then be transported to an above-ground concrete pad on the Limerick property. It will be slid horizontally into a reinforced concrete structure slightly larger than a one-car garage.



SOURCES: The Nuclear Regulatory Commission and Transnuclear Inc., of Columbia, Md., the company providing Limerick's dry cask system.

The Philadelphia Inquirer



Dry cask storage is used at the Oyster Creek nuclear power plant in New Jersey. Here, concrete vaults hold steel canisters. †

READING EAGLE

Reading, Pennsylvania | www.readingeagle.com | MONDAY July 10, 2006 | 50 cents



Reading Eagle: Jeremy Drey

The cooling towers at Limerick Generating Station are the most visible part of the plant, where officials want to begin storing used nuclear fuel in outdoor containers beginning in 2009.

Storing nuclear waste in spotlight at Limerick

Officials at the power plant in Montgomery County will defend their plans to store used reactor fuel in outdoor vaults at a meeting Tuesday.

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By Mike Urban
Reading Eagle

Residents and officials in Montgomery County have concerns and questions about Limerick Generating Station's plan for storing nuclear waste, officials from Limerick Township and the plant have said.

But the facility's experts hope to answer those questions Tuesday.

Exelon Corp., which owns the plant in Limerick Township, will hold a community open house from 4 to 7 p.m. in the township building.

Exelon's plan is to store spent, or used, nuclear fuel in airtight steel cylinders that would be housed in outdoor concrete vaults beginning in 2009, company spokeswoman Elizabeth Rapczynski said.

HOW SPENT
NUCLEAR
FUEL IS
STORED

Before Exelon can build the vaults, the township supervisors must approve its proposal to build a 10,000-square-foot concrete pad to hold the vaults and two related buildings for equipment storage.

The supervisors plan to vote on the proposal at their meeting Thursday night.

Nuclear continues on A2

Questions answered

Exelon Corp. and towns Limerick Generating Station Mont. County, Monday will host a public information session Tuesday from 4 to 7 p.m. concerning its plan to store used nuclear waste.

The meeting will be held in the Limerick township municipal building, 645 W. Ring St. Limerick. The meeting is at 7 p.m. Limerick township supervisors' experts will be on hand to build a concrete pad and two equipment storage buildings. Limerick Generating Station is the site of the project. The pad and storage buildings would be on the grounds of the generating station.

NUCLEAR | Waste questions to be answered

Continued from A1

Several weeks ago, the township planning commission recommended the supervisors reject the plan because of a lack of information, but since then, the company has better explained its proposal to Limerick officials, Supervisor Renee Chesler said.

Security concerns limited the information in the initial proposal, Rapczynski said.

The waste storage facility, known as a dry cask system, would follow a U.S. Nuclear Regulatory Commission-approved design and does not require township approval, said Joseph H. McGroory Jr. of Norristown, township solicitor.

The commission would inspect the construction and storage procedures and review the system regularly once it is in use, commission spokeswoman Diane Scenci said.

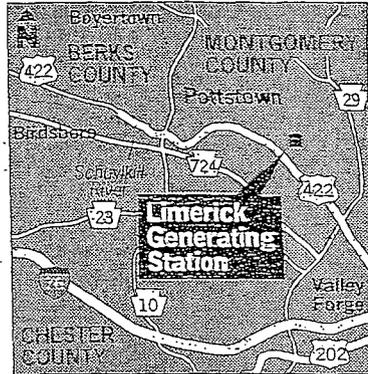
Limerick and other nuclear plants use heat from uranium to boil water, and the steam turns turbines to generate electricity.

About every two years, one-third of the uranium must be replaced, and that spent fuel is put in permanent storage, she said.

The Limerick station has been storing spent fuel indoors in steel-lined concrete pools of water since it began commercial operations in 1986, Rapczynski said.

But the plant needs additional storage because its indoor storage area will be full by 2009, and the national underground storage facility proposed for Yucca Mountain, Nev., is not expected to be ready until 2015, she said.

The dry cask system would



Reading Eagle

give the plant storage through 2020, Rapczynski said.

Preliminary construction would start this fall, she said.

America's first dry cask system began use in 1986, and there now are about 35 such facilities nationwide, including four that Exelon operates, she said.

None has resulted in radiation releases that affected the public or in radioactive contamination, and there have been no attempts to sabotage the systems, Scenci said.

"The systems are safe and environmentally sound," she said.

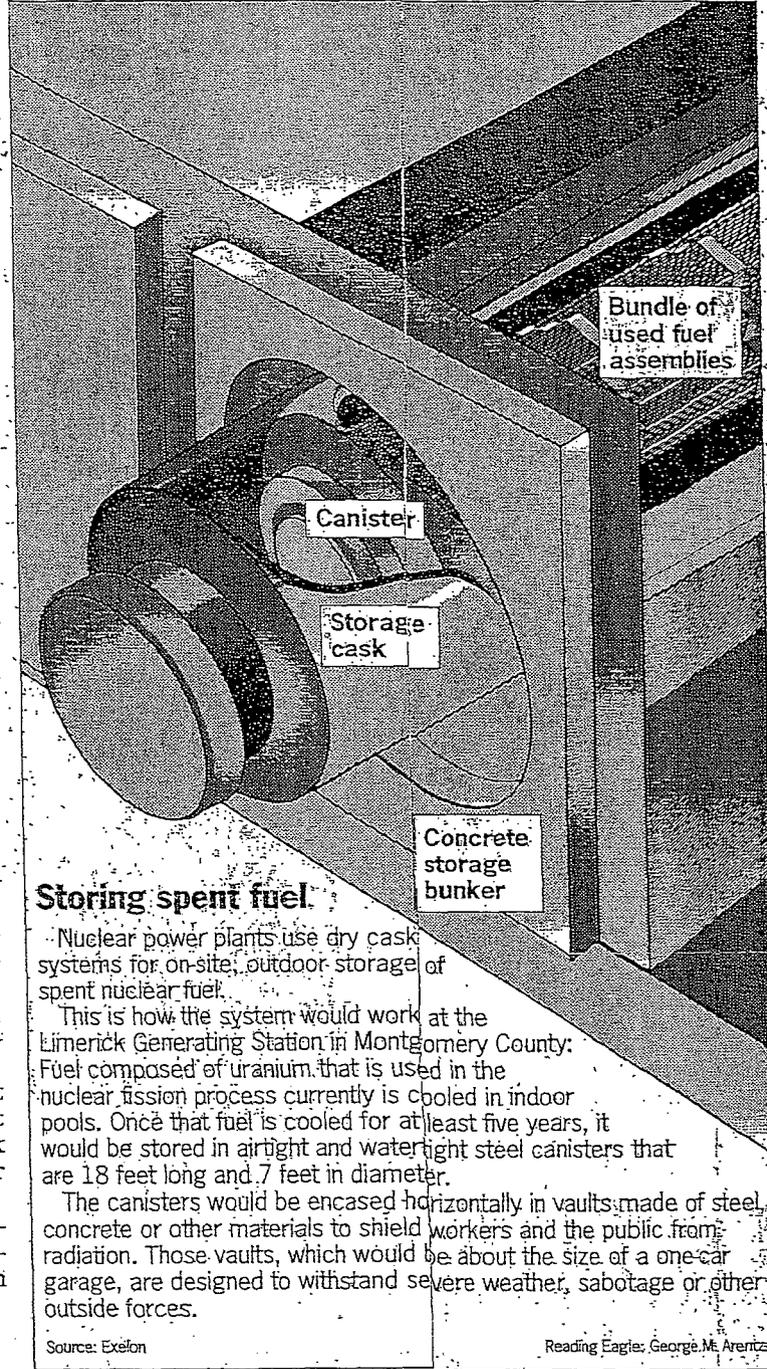
Rapczynski said that people living near the plant have nothing to fear.

"This is a proven technology, and it will be protected with robust security," she said.

Chesler said she did not know how she would vote but commended both the Limerick plant and the commission for their past actions.

"The plant has been an extremely safe facility, and both Exelon and the NRC have proven track records," Chesler said.

Contact reporter Mike Urban at 610-371-5023 or murban@readingeagle.com.



Storing spent fuel

Nuclear power plants use dry cask systems for on-site, outdoor storage of spent nuclear fuel.

This is how the system would work at the Limerick Generating Station in Montgomery County: Fuel composed of uranium that is used in the nuclear fission process currently is cooled in indoor pools. Once that fuel is cooled for at least five years, it would be stored in airtight and watertight steel canisters that are 18 feet long and 7 feet in diameter.

The canisters would be encased horizontally in vaults made of steel, concrete or other materials to shield workers and the public from radiation. Those vaults, which would be about the size of a one-car garage, are designed to withstand severe weather, sabotage or other outside forces.

Source: Exelon

Reading Eagle: George M. Arentz



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The Mercury

Pottstown, Pennsylvania

Public worried over safety of spent fuel rods

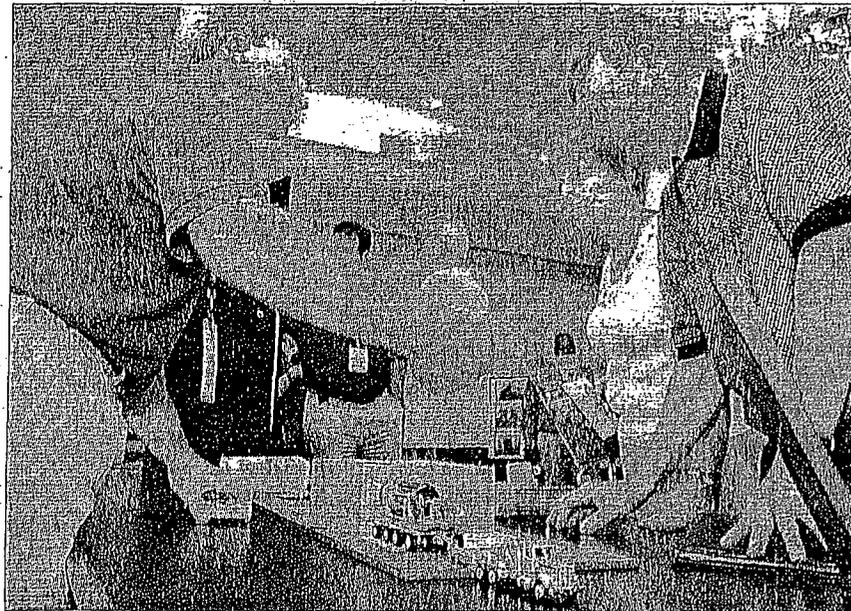
By Lindsay Moyer
lmoyer@pottsmmerc.com

LIMERICK — Many area residents who attended an information session on plans to store spent nuclear fuel left feeling better about the project, but others voiced concerns or outright opposition.

Exelon Nuclear's Limerick Generating Plant held the public open house Tuesday after the township planning commission voted unanimously to recommend that the Board of Supervisors reject land development plans for the project. The supervisors' vote is scheduled for Thursday.

Officials from Exelon, the Nuclear Regulatory Commission and Transnuclear Inc., the vendor from which Exelon is purchasing the dry cask system, were present at the open house to answer questions.

The three groups set up informational tables that included brochures, display maps and photographs, videos, a project model and even simulated



Daniel P. Creighton/The Mercury
Independent spent fuel storage installation project engineer Andy Giangliullo answers questions of Shirley Shearer of Linfield, who opposes the plan, and Wesley Huff of Limerick, who is for the plan.

nuclear fuel pellets for those attending to peruse.

Many people wanted to know where the above-ground casks housing spent fuel would be located, project manager Kevin Carrabine said. He drew a basic diagram that showed their placement, immediately west of the main power block of buildings and

inside the plant's security perimeter.

Carrabine and other officials said that most people were also asking when Yucca Mountain would open, at which time spent fuel stored in the dry cask system would be transported to the nuclear depository in Nevada.

(See EXELON OPEN HOUSE on A3)

The Exelon Nuclear Generating Station held an open house at the Limerick township building to answer questions and provide information about nuclear fuel waste storage planned for the Limerick plant. Above, a small model nuclear fuel storage building and vehicle were on display to demonstrate the process of storing it at the facility. At right, a number of area residents turned out at the meeting to question Exelon employees.



Photos by Daniel P. Creighton/The Mercury

Public worried over safety of spent fuel rods

(EXELON OPEN HOUSE from A1)

Although the answer to that question isn't definite, Carrabine said, it's not expected to open before 2015.

By 6:30 p.m., nearly 40 people had visited the open house, and project engineer Matthew Eyre said he'd heard widely varying opinions about the project from the visitors.

"It went from one person who said, 'You can talk to me all you want but I won't like this,' to one guy who said, 'You should build more of these,'" Eyre said.

Joseph Browne, a Pottstown resident, said he thought the proposal looked "pretty good safety-wise" and he didn't think the storage facility would pose a terrorism risk.

"I don't see terrorists seeing this as a good source of material," Browne said. "It's too limited. They want to do something in the middle of New York City."

Joe Howard, also of Pottstown, agreed with Browne that Exelon's project plans looked safe.

"It seems like they'll be protecting (the fuel storage casks)," Howard said. "I think they've got a responsibility, and

they're trying to handle it pretty good."

Limerick planning commission member Michele Chrisman said she came to the open house to see if Exelon would provide information that the commission requested, but didn't receive, before it unanimously voted against recommendation of the proposal.

Exelon said it didn't provide the information because of security concerns.

"It seems to be the same information," Chrisman said. "It's the same photos from the brochures. I'm disappointed they're not telling people more."

Chrisman, who is also a member of the township emergency management team, said she has "reservations" about the safety of the project.

"There's too many unknowns — what could fail, the ramifications if it does fail, and how do you move them?" she said.

Deborah Yusko, who lives near the nuclear plant, said she was "extremely concerned and extremely opposed" to the dry cask storage project.

"They tell you how safe it is," she

said. "Most people who tell you that don't live within the 20-mile radius affected. There's probably a reason for that."

Yusko said she was also concerned about the information provided by Exelon.

"I think that there are a lot of safety issues that can happen, but they're not going to tell you," she said. "Maybe it won't affect me, but it will affect my kids."

NRC health physicist Robert Prince assured residents who turned out for the open house that the project would be conducted safely with oversight from the NRC. That oversight, which would take place after approval by township supervisors, would include ensuring that Exelon's existing programs are revised to address the dry cask storage project, overseeing a "dry run" of loading the casks and the actual loading, and routine inspections, Prince said.

Township supervisors will meet at 6 p.m. Thursday at the township building on Ridge Pike to vote on Exelon's land development proposal.

The Mercury



Wednesday, July 12, 2006

READERS' VIEWS

Editorial was right on the mark

The Mercury deserves recognition and praise for the excellent editorial on July 9 about storage of high level radioactive waste at the Limerick Nuclear Power Plant.

Storage (or is it really disposal?) of high level waste at the Limerick power plant should be of concern to all who receive electricity through the PJM grid which includes some or part of 13 states and D.C. If there is an accident or if there is an act of terrorism, millions of us in the area of this grid could be without electricity. Indeed, it should be of even more concern to those of us who live within a 25-mile (at the least) radius of the site. I am one of those who live within 10 miles of Limerick and I received one of those 118,000 new emergency brochures.

Terrorism is the reason to worry. The federal courts in a California case have ruled that the NRC must prepare an Environmental Impact Statement (EIS) which considers the problems of dry cask storage and terrorism.

The discussion of the proposal to use dry casks at Limerick must be wider than just as a matter of concern to Limerick. This is why I think the township should tell the NRC to require an EIS which must include a full on-the-record public hearing for those of us who live within 10 miles, and indeed for all the general public who could be impacted. Expecting and

allowing the decisions on dry cask disposal/storage to be only on the shoulders of the Limerick supervisors is a heavy burden for them and one they should seek to put on others.

One-on-one and booth-by-booth public relations is just not the answer. Exelon's dog and pony show, no matter whether it is at a public or private site and no matter who pays for advisers and their supposed expertise, is not good enough when it comes to this issue.

I have confidence in public decision-making. It seems to me that this could be a life and death issue for many beyond the boundaries of one township. Broaden out the decision making burden and ask for a full EIS and public hearing, and let all of us be heard on this decision.

TINA DALEY
Phoenixville



OUR VIEW

Limerick review of fuel storage requires caution

The lessons we learn from history are often as simple as the fact that there is much still to be learned.

On Sept. 20, 1971, James L. Everett, then-president of PECO, was quoted predicting that the Limerick power plant would reduce consumption of fossil fuels, a statement we now know to be inaccurate. He also made predictions about the problem now facing the Limerick plant of how to dispose of spent fuel rods.

"The relatively low volume of high-level wastes means that ultimately, disposing of them will not be an overwhelming problem," said Everett, of the spent fuel potential. "If we ever decide we don't want radioactive wastes on earth, we have a simple solution. We can load them in rockets and shoot them into the sun."

Now, some 35 years later, the suggestion is absurd. But when Everett made the statement, no one foresaw that disposing of nuclear waste would be a huge problem. It would have seemed that a workable, safe system would have been devised by now.

It hasn't been.

As the Limerick supervisors prepare to vote on an Exelon proposal for spent fuel rod storage, the thing to keep in mind is the uncertainty of the future.

Exelon is proposing to erect 24 steel and concrete canisters to hold the spent nuclear fuel that has been accumulating in storage pools inside the plant since it was constructed. Each canister can hold 61 bundles of fuel rods. Each bundle holds as many as 64 to 289 rods of uranium pellets, the stuff that will remain dangerously radioactive for 500,000 years.

Exelon, like other nuclear plants across the country, has been forced to construct "temporary" storage facilities because the plan to build a national depository for the fuel beneath Yucca Mountain in Nevada is decades behind schedule and is mired in scientific and political controversy.

Kevin Carrabine, Exelon's project manager, said last month that each year, the Limerick plant plans to fill four canisters. Although plans only call for 24 canisters, the approximately three-foot thick concrete pad on which the canisters will rest will be big enough to house about 90 canisters, said Carrabine.

The plan to build the pad for those canisters, as well as several outbuildings, was rejected earlier this month in a unanimous vote by the township's planning commission. However, they are a recommending body only and the final decision rests with the supervisors, who have scheduled a vote on the project for Thursday night's township meeting.

The supervisors also have some restrictions as to what they can approve or reject. The realm of approval applies only to the land development plan, not the issues of how best to house the rods.

For citizens who have questions about the project specifics, Exelon has planned an open house on Tuesday from 4 to 7 p.m. in the township building for discussion of the storage issues.

The supervisors are also starting their Thursday meeting early, at 6 p.m., to allow for public questions, and they have hired two consultants — one for the science and one for perception — to help them make and explain their decision.

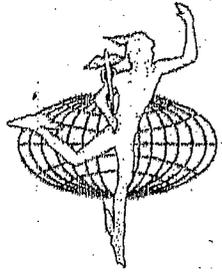
What they need to keep in mind is how much the world has changed since Everett's comments in 1971 about shooting waste into the sun. Five years ago, no one would have thought people would deliberately fly planes into the venerable World Trade Center. They did, and their actions displayed places and things to be feared that we had never feared before.

We can not know what may hurt us in the future; we can not be certain what we have not yet seen that may become a threat. That's why plans for disposing of long-term radioactive waste must use the most protective position available, including offsetting the risks of terrorist attack.

To do otherwise is to betray the future.

Limerick supervisors must reject the plan as it now exists and send Exelon back to come up with something better. At the very least, the casks should be camouflaged in earth bunkers and spread out so as not to present a single target.

If protective measures are not followed now, it will be too late. The opportunity to get it right will be lost for the next 500,000 years.



The Mercury

Sunday

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Pottstown, Pennsylvania

Running out of space

Loaded question of how to store radioactive fuel rods

By John Gentzel

jgentzel@pottsmmerc.com

One of the main problems with nuclear power generation is what to do with the highly radioactive and extremely dangerous spent fuel that will remain deadly for thousands of years after it is no longer in use.

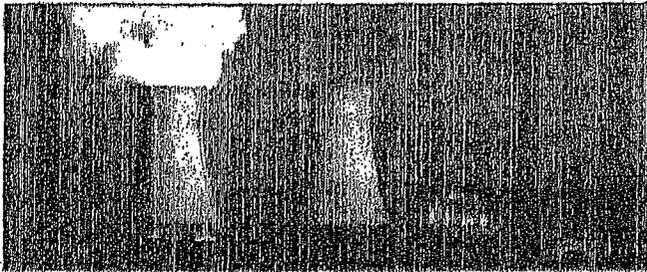
Nuclear power plants were designed to hold roughly a decade's worth of spent fuel in large, steel-lined pools of water that allow the fuel assemblies — bundles of rods that contain uranium pellets, which are the keys to the reac-

tion process — adequate time to cool.

But most of the nation's 103 nuclear power plants are running out of space in their pools. The Limerick Generating Station will have exhausted its current space by 2009, and many, including the Peach Bottom Atomic Power Station in York County, are already out of room.

The government previously made the determination that a single, long-term spent nuclear fuel repository was needed.

(See SPENT FUEL on A3)



Daniel P. Creighton/The Mercury

The Limerick Nuclear Generating Station will run out of space to store spent fuel by 2009, a year before Yucca Mountain could become the nation's spent nuclear fuel repository.

Loaded question

of how to store radioactive fuel rods

NT FUEL from A1)

Although billions of dollars have been spent studying Yucca Mountain in Nevada as the possible location for the nation's spent nuclear fuel repository, the mountain in the desert outside Las Vegas is of no help now as it will not be ready for business until 2010 at the earliest.

By then, almost 80 of the nation's nuclear facilities are expected to be out of storage capacity.

As an intermediate solution to the problem, the Nuclear Regulatory Commission has devised a method for storing spent fuel in fortified above-ground canisters that use air — not water — to cool the radioactive material.

At more than 18 feet tall and 90 tons empty, these canisters can hold up to 68 spent fuel assemblies in heavily fortified structures that are designed to withstand virtually any kind of severe weather.

Using more than \$11 million worth of specialty cranes and heavy transports, it takes more than a week to load and then transport the canisters that when full weigh roughly 115 tons to a secure, outdoor containment area the size of a football field.

The containment area at Peach Bottom looks just like a large parking lot overlooking the Susquehanna River. But with razor-wire fencing surrounding the containment area's perimeter, gates and hundreds of security cameras, it's anything but an average parking lot.

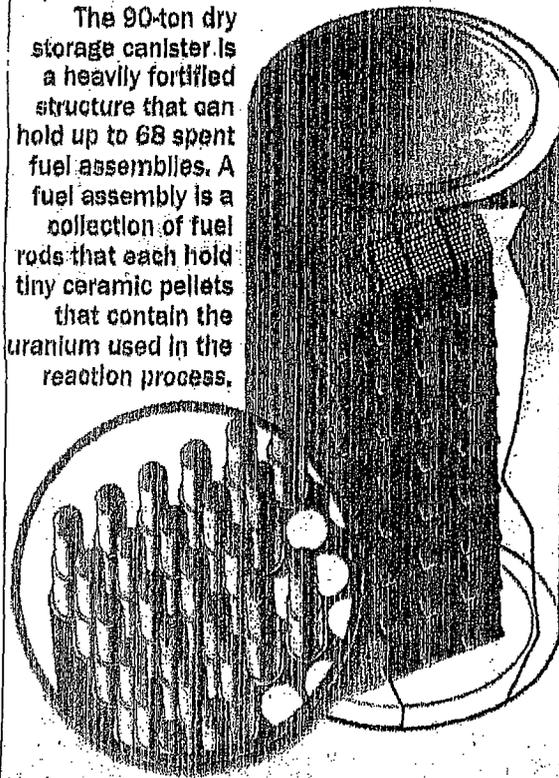
"This is an extremely secure facility," said Peach Bottom spokeswoman Fran Reining. "It's under the same security as the facility's protected area has," referring to the reactor building and surrounding structures.

"Security shouldn't be an issue," Reining said, but when dealing with nuclear fuel, no number of cameras or national guardsmen can deflect questions about the potential safety implications with storing such a dangerous material out in the open.

Dave Simon, spokesman for Peach Bottom and Exelon Nuclear's parent company, Exelon Nuclear, said discussions about safety are inevitable.

"These structures are extremely safe," he added.

The 90-ton dry storage canister is a heavily fortified structure that can hold up to 68 spent fuel assemblies. A fuel assembly is a collection of fuel rods that each hold tiny ceramic pellets that contain the uranium used in the reaction process.



William H. Coldren/The Mercury

It's the government's determination that dry-storage canisters are the best temporary solution until Yucca Mountain is opened.

After spending years studying an issue, "you go with the best science and standards that you have right now," Simon said, "to ensure the greatest safety that you can."

While it's possible to reprocess nuclear fuel (as is currently done in Europe but not in the United States), it's very expensive, Simon said.

Temporary repositories cost companies an initial outlay of millions, for the specially designed containment pen as well as the 150-ton crane needed to lift and the transport vehicle needed to move the canisters. After that, electricity and security personnel are the only expenses, Simon said.

"Once you cover what it costs to build the facility, put them in there long term, then it's like a house," Simon said, adding that engineers routinely test and monitor the canisters.

All of the people involved in the process, whether it be the transport driver or the engineer assigned to check radiation levels, are licensed and regulated by the NRC.

That means they're not the same type of contracted workers (brought in as extra help during maintenance outages) who recently allowed the accidental shipment of low-level nuclear waste from the Limerick Generating Station to the Pottstown Landfill instead of the appropriate disposal location.

"This is a detailed and closely monitored process," Reining said. "A lot of planning goes into it."

There's a higher "probability of sending the trash out to the wrong place," she added, "than something going wrong with a 90-ton, stainless steel" containment cask.

"It's a major responsibility, and one we take extremely seriously. We're moving nuclear fuel. We're not moving cookies, you know."

For more information on the Web, see the Nuclear Energy Institute at www.nei.org or the Nuclear Regulatory Commission at www.nrc.gov

RADIOACTIVE WASTE TRANSPORTATION CALLED A "MOBILE CHERNOBYL"

FACTS IN THIS REPORT COMPILED BY ACE SHOW WHY
April, 2011

This Report Was Compiled By ACE For A PA Senate Program
Legislation Was Discussed In PA In 2011 To Transport Nuclear Waste Across All Municipal Borders And Take Away Public Rights To Say No. The bill would have prohibited PA municipalities from approving any ordinance, rule, or regulation that prohibits transportation by rail, road, or water of any nuclear waste products through their municipal borders.

THIS REPORT SHOWS WHY HIGH-LEVEL RADIOACTIVE WASTE TRANSPORTATION IS TOO GREAT A RISK

- 1. Nuclear power plant waste consists of high-level radioactive wastes that are among the deadliest materials on Earth. They are both thermally and radioactively hot decades after removal from fuel pools, making transport extremely dangerous.**
 - Transporting hundreds, possibly thousands of high-level radioactive waste trucks and trains through PA communities is an unacceptable, unnecessary risk to millions of PA families, resulting in potentially devastating accidents and/or terrorist attacks.
 - ✓ Each fuel assembly contains 10 times the long-lived radioactivity released by the Hiroshima bomb.
 - ✓ Trucks contain 1 to 4 fuel assemblies.
 - ✓ Trains contain up to 24 fuel assemblies.
 - Accidents will happen.
 - ✓ DOE estimates that at least 50 accidents could occur during shipments of the nation's radioactive wastes.
 - ✓ The more severe the accident, the more radiation would be released to the environment.
 - ✓ Even a low speed accident could unseat a valve or damage a seal, releasing radioactive particulates to the environment.

- ✓ It could also crack brittle metal tubing around the fuel.
- ✓ The American Petroleum Institute says at least 15 accidents are expected each year with thousands of truck shipments.
- ✓ Some studies on spent fuel show the kind of damage that can be done by a nuclear fuel disaster during transport.
- ✓ NRC studies are woefully inadequate and deceptive when they claim nuclear waste transport is totally safe.

- **FIRES associated with truck or rail accidents increase the probability of radioactive releases from nuclear wastes transported.**

- ✓ If a truck or train accident resulted in fire, spent fuel rods could "heat up, self-ignite and burn in an unstoppable fire." Numerous scientific experts warn that burning fire on zirconium cladding of nuclear waste can trigger an exothermic reaction.
- ✓ Shipping containers are only designed to withstand a 1/2 hour fire at a temperature of 1475 degrees. NEI's inadequate testing was only 90 minutes at 2000 degrees.
- ✓ Rail fires could burn for hours, sometimes days, at temperatures considerably higher.
- ✓ Heat could vaporize some of the radioactive materials and sweep them up into the air.
- ✓ Persons downwind can inhale radioactive particles and later develop cancer or genetic defects.
- ✓ It's important that fires are extinguished within 1/2 hour, yet there is often confusion about who has responsibility for cleanup and protecting public health in a radioactive emergency.
- ✓ There is real potential for fire resulting from a transportation accident involving high-level radioactive wastes, which could have similar consequences as radiological weapons.
- ✓ Fires could be caused by many things during nuclear waste transport by truck or train, both by accidents and terrorists.

- **Terrorists Attacks**

- ✓ Transport casks are vulnerable to terrorist attacks with planes or missiles from afar, and/or bombs ignited on transport vehicles, causing fires that will release radiation. Some call transport it a potential "Mobile Chernobyl".
- ✓ Army testing proves transport casks can be penetrated with a missile.
- ✓ Jet plane fuel from a deliberate crash into a transport vehicle could cause a devastating fire, even with a small plane.
- ✓ The largest casks carry the equivalent of some 200 Hiroshima bombs in a long-lived radiological equivalent.

- **Lax Security Documented**

- ✓ Evidence that "Waste Trains" are not protected from terrorists, "**Security Breach on Nuclear Waste Train.**" 4-30-02 Durham, N.C.
- ✓ Inmates Jump Wrong Train, Revealing Vulnerability.
- ✓ Terrorists would not have boarded the train unarmed.
- ✓ If these people intended to cause serious harm, they were in perfect position.
- ✓ Defenders did not deny access.
- ✓ If those who boarded the train had been attackers carrying explosives who were willing to sacrifice their lives, there could have been a serious problem.
- It is absurd for the nuclear industry to suggest that their wastes are self-protecting due to exposure to radioactivity. This ignores reality, including the real potential for air strikes and missile attacks.

2. INCIDENTS / ACCIDENTS ALREADY HAPPENED

- 72 transport "Incidents" and accidents were documented by Nevada Agency for Nuclear Projects - "*Reported Incidents Involving Spent Fuel Shipment, 1949 to 1996*"
- "Incidents" can be quite significant, according to Dr. Marvin Resnikoff's 1983 book, "*The Next Nuclear Gamble: Transportation and Storage of Nuclear Waste...*"
 - ✓ One incident led to radiation contamination of hundreds of miles of PA Highways in 1981. It went unreported for 5 days. NRC never took action.

3. Local elected officials should have a right to say no to the transport of deadly wastes through their communities when it could seriously jeopardize health and financial interests of their entire region.

- DOE reports size of region impacted for public health and safety along transportation routes:
 - ✓ 50 Miles (80 kilometers) for Accident Conditions
 - ✓ .5 mile (800 meters) on either side of the transportation right of way (non-accident conditions).
- DOE estimated a severe accident involving 1 radioactive waste cask, releasing a small amount of radiation, would:
 - ✓ Contaminate about 42 square miles for well over 1 year, with devastating economic consequences in an urban setting.
 - ✓ A period greater than 1 year to attempt to clean up radioactive residue.
 - ✓ NRC 1980 study estimated economic consequences at \$2 Billion.
- Radiation dose from an accident or terrorist attack breaching transport containers (1 yard away) could result in:
 - ✓ A lethal radiation dose (500 rem) in less than 3 minutes
 - ✓ Significant increased risk for cancer or genetic damage in just 30 seconds (100 rem)
- NRC's pamphlet says 10 years after waste is removed from reactors, an unshielded radiation dose could exceed 20,000 rems per hour.
 - ✓ 5,000 rems can cause incapacitation and death within a week
- Thermal Images of Traveling Nuke Wastes Suggest You Wouldn't Want To Get Stuck In Traffic Anywhere Near One.
 - ✓ Traveling nuclear waste casks could emit significant radiation.

4. INJUSTICE - The nuclear industry is promoting unjust legislation that seriously jeopardizes the public's rights, safety, public health, and financial interests.

- Many Jurisdictions Officially Opposed Nuclear Waste Transportation Through Their Communities,
 - ✓ Including Philadelphia, Bucks County, and Falls Township in PA.

The state should not take away the right of communities to protect their residents. Given the unthinkable risk of health and financial devastation involved, it's not only unfair, it's immoral and unethical.

- At stake - health and potential total loss of homes and all possessions for generations.

- Property values decline along nuclear waste routes, a fact verified in 5 states, by damages for reduced property values
 - ✓ Residents should not be "stuck" with property that they can't sell along a nuclear waste transportation route.
 - ✓ Most states have disclosure laws, requiring buyers to be told.
- Insurance Does Not Cover Radiological Incidents or Accidents:
 - ✓ Homeowners insurance will not cover loss of real estate use or personal property caused by radiological accidents.
 - ✓ Health insurance would not cover your long-term or permanent radiological damage or other long-term serious illnesses caused by a nuclear accident.
- PA residents are especially vulnerable to high-risk, high-level radioactive waste transport accidents or terrorist attacks because PA has the 2nd highest number of nuclear plants and high-level radioactive waste in the nation.
 - ✓ PA communities would be exposed to large amounts of nuclear waste in all too frequent shipments as long as nuclear plants continue to operate and build up piles of deadly radioactive wastes.
- Communities gets risks - Nuclear industry gets benefits.
 - ✓ Once the waste leaves the site, the public has all the financial responsibility to store this deadly waste for an eternity.
 - ✓ EPA set a million-year health standard.
 - ✓ Why should taxpayers have to foot the bill for any problems caused by the nuclear industry's deadly wastes?
- It is outright deception for nuclear industry supporters to assert that transport to another location will remove risks at nuclear plants.
 - ✓ As long as nuclear plants operate, this deadly waste will keep piling up in fuel pools and casks.
 - ✓ Transport won't reduce the number of radioactive waste sites, it just adds enormous risk to the already unprecedented threats from high-level radioactive wastes.

5. LEAST BAD SOLUTION: STORE IT ON-SITE "SAFER"

➤ And STOP MAKING IT!

- There is no safe way to store this deadly waste.
 - ✓ Evidence shows we don't need and can't afford dirty, dangerous, and costly nuclear power and its deadly waste.
 - ✓ Solar, wind, geothermal, and other renewables are ready right now, don't create these kinds of risks, and are cheaper than nuclear power if all costs to the public for nuclear power are included.

**The Alliance For A Clean Environment
April, 2011**

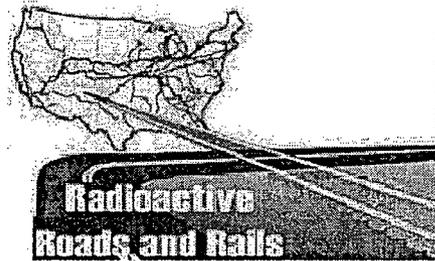


For more information, contact:

Public Citizen's Critical Mass
Energy and Environment Program
215 Pennsylvania Avenue, SE
Washington, DC 20003
www.citizen.org/cmep
202-546-4996
202-547-7392 (fax)

OR

Nuclear Information
Resource Service
1424 16th Street, NW
Washington, DC
www.nirs.org
202-328-0002
202-468-2183 (fax)



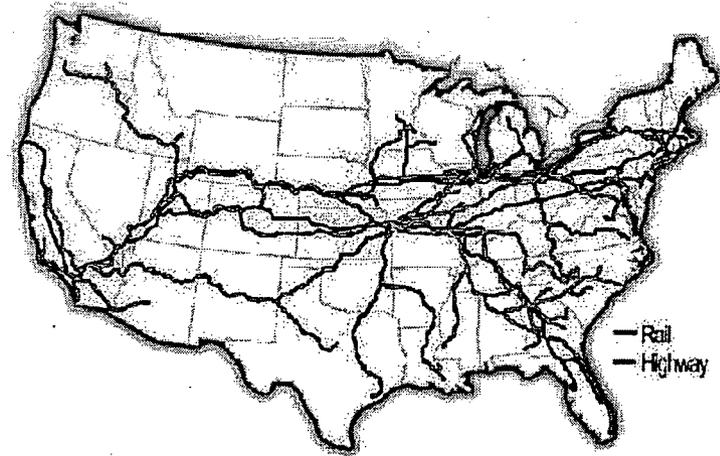
Get the Facts on PROPERTY VALUES and Nuclear Waste Transportation!

Why will nuclear waste be travelling through my state?

Yucca Mountain is the only site being considered by the Department of Energy (DOE) as a "permanent disposal" site for the United States' highly radioactive nuclear waste. This spent nuclear fuel and high-level waste is currently located at 77 sites across the country and would have to be transported by truck or rail to Yucca Mountain if that site is approved as a nuclear dump.

Several thousand shipments of nuclear waste would travel through 43 states—past the homes of 50 million Americans for 25 years. Experience has shown that property values decline significantly along nuclear waste routes. Using the Department of Energy's own data, it can be

estimated that between 70 and 310 accidents and over 1000 incidents would occur during the nuclear waste shipping campaign if trucks are used as the preferred mode, and between 50 and 260 accidents and over 250 incidents if trains are used as the preferred mode. The Department of Energy also estimates that a severe accident in a rural area releasing a small amount of radiation would contaminate 42 square miles for well over one year. A similar accident in an urban area would have devastating consequences to the economy and public health.



Disclosure Laws Require Buyers To Be Told If Property Is On A Transportation Route

Most states require that potential property buyers be informed if the property for sale is located on a potential nuclear waste transportation route. This means that even if nuclear waste isn't already traveling past your home, your property value may decrease. Residents should not be "stuck" with property that they cannot sell along a nuclear waste transportation route.

<p>Other lawsuits similar to the Komis case include a class action lawsuit by 50,000 Coloradans against Rockwell International for \$550 million in reduced property values, and lawsuits by neighbors of the Oak Ridge plant in Tennessee, the Hanford plant in Washington, and the Mound plant in Ohio. In 1990, the community around the Fernald plant in Ohio received \$78 million from the government.</p>									

Many Jurisdictions Are Officially Opposed to Nuclear Waste Transportation through Their Communities!

These include Los Angeles, Ventura, Santa Barbara and San Luis Obispo Counties, and the city of Santa Barbara, CA; Denver, CO, St. Louis, MO; Philadelphia, Bucks County, and Falls Township, PA; Mt. Rainier, Takoma Park and Greenbelt, MD; Marshall and Anson Counties and the town of Wadesboro, NC; Decatur, GA; Amherst, MA, Beacon, NY and more.

Sante Fe vs. Komis—The Court Awards Property Damages

In 1992, the New Mexico Supreme Court upheld a jury decision to award John and Lemonia Komis \$337,815 in damages for perceived loss due to public perception of fear. The Komis property was located along a Waste Isolation Pilot Project (WIPP) nuclear waste transportation route, and the case proved that property values do indeed decline because people are afraid of the dangers associated with nuclear waste transportation.

In the case decision, the court referenced a public opinion survey conducted by Zia Research Associates, Inc., which showed that 71% of the respondents believed that residential property value would decrease because of its location near a WIPP route.

The Court also stated in its decision that "Whether the transportation of hazardous nuclear materials actually is or is not safe is irrelevant; the issue is whether public perception of those dangers has a depressing effect on the value of the property not taken." In other words, your property value may decrease simply because people are afraid of the possible consequences of nuclear waste transportation!

Get your local government to pass a resolution Opposing Nuclear Waste Transportation through your community?

WHEREAS, according to documentation provided by the State of Nevada which indicates that radioactive waste may be transported through [this jurisdiction] as early as 2006 should Senate Bill # 287 or similar legislation be enacted by the U.S. Congress;

and WHEREAS, [this jurisdiction] does not have adequately trained emergency response personnel or equipment to cope with a radiological disaster that could occur as a result of radioactive waste transportation through [this jurisdiction];

and WHEREAS, the federal government, under the bills listed above, would limit funding to [this jurisdiction] for training of emergency response personnel and for purchase of necessary equipment to cope with a radiological emergency;

and WHEREAS, property values are likely to fall, attraction of new business is likely to fail, and improvement of the communities [our community] may become difficult if not impossible should radioactive waste be transported through [this jurisdiction];

and WHEREAS, this radioactive waste is to be transported to an "interim" site in Nevada, and thus does little or nothing to solve our nation's radioactive waste problem;

and WHEREAS, we generally oppose radioactive waste transportation through [this jurisdiction];

BE IT RESOLVED, that [this jurisdiction] is on record as opposing any and all legislation which would require radioactive waste transportation near or through [this jurisdiction];

and BE IT RESOLVED, that [this jurisdiction] supports creation of an independent presidential commission to re-examine our nation's radioactive waste policy;

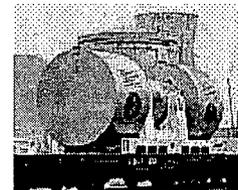
and BE IT RESOLVED, that [this jurisdiction] will carry this resolution to all of our elected local, state, and federal officials, and to the President of the United States.

Shipments Will Be Frequent and Will Occur for Many Years

Depending on where you live, as many as 3-5 shipments per week could roll past your home for 25 years. Because most of the nuclear waste is located in the East and Yucca Mountain is in the West, many communities will be exposed to large amounts and frequent shipments of nuclear waste throughout the entire shipping campaign.

The Department of Energy reports that the region of impact for public health and safety along transportation routes is 800 meters (.5 mile)

on either side of the center line of transportation rights-of-way for non-accident conditions, and 80 kilometers (50 miles) for accident conditions.



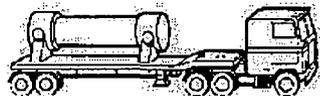
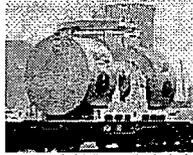
Insurance Does Not Cover Radiological Incidents

Neither homeowners insurance nor health insurance covers problems caused by radiological accidents. Check your policy! It will explicitly state that you will not be covered if your damage or illness is caused by a nuclear accident.

What does a radioactive waste transportation cask look like?

The casks that would be used to transport high-level nuclear waste look like large concrete dumbbells. The nuclear waste would be housed in the middle section, and the end sections are called "impact limiters." These casks have never been properly tested, and the consequences of an accident could be severe.

The DOE's own estimates suggest that at least 50 accidents could occur during shipment of radioactive waste. As part of the 1986 Environmental Assessment for the Yucca Mountain repository site, the DOE conducted a study that found that a severe accident in a rural setting involving a high-speed impact, lengthy fire and fuel



oxidation would contaminate a 42-square-mile area, require 462 days to clean up and cost \$620 million. The health, economic and environmental impacts of such an accident could devastate a community. If such an accident occurred in an urban area, the costs and other consequences would be much more severe.

Will the value of my property be affected by the Government's plan to transport nuclear waste to Yucca Mountain?

Experience has shown that property values decline significantly along nuclear waste routes. In 1992, the New Mexico Supreme Court upheld a jury decision to award John and LEMONIA KOMIS \$337,815 in damages for perceived loss due to public perception of fear. The KOMIS property was located along a Waste Isolation Pilot Project (WIPP) nuclear waste trans-

portation route, and the case proved that property values do indeed decline because people are afraid of the dangers associated with nuclear waste transportation.

Most states require that potential property buyers be informed if the property for sale is located on a potential nuclear waste transportation route. This means that even if nuclear waste isn't already traveling past your home, your property value may decrease, and your property may become difficult to sell. Residents should not be "stuck" with property that they cannot sell along a nuclear waste transportation route.

Are the casks safe?

Nuclear waste transportation casks have never been fully physically tested. The Nuclear Regulatory Commission sponsored a study in 1987 completed by the Lawrence Livermore National Laboratories. This study, commonly referred to as the "Modal Study," used computer modeling only to predict cask responses to accident conditions. The study was inadequate because it did not use real life, full-scale testing of the casks. Further, the test criteria were developed in the 1960's and have not changed since, despite changes in traffic volume, travel speeds, and hazardous cargoes on our roads and rails.

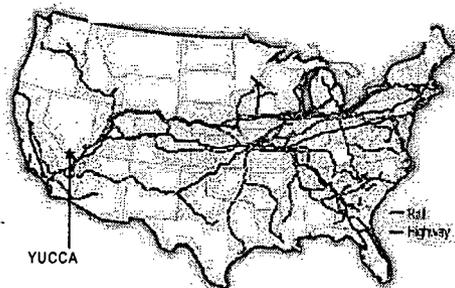
Even the Nuclear Regulatory Commission realizes that these tests were inadequate, and has contracted with Sandia National Labs to conduct a new study, called "Modal II," or the "Package Performance Study." Although this study is very much needed, it will not be completed until 2003—long after the Department of Energy applies for a license to construct and operate a nuclear waste repository at Yucca Mountain.

All tests to date have been computer simulated and have NOT been fully physical tests.



Will Radioactive Waste Travel Through My State?

The nuclear power industry has created thousands of tons of deadly nuclear waste, and it could soon be traveling through your community! Along with its allies in the federal government, the nuclear industry is pushing Congress to establish a nuclear waste dump at Yucca Mountain, Nevada. If they are successful, 100,000 shipments of high-level radioactive waste, now located at 77 sites across the country, will be transported through 43 states. Fifty million Americans will be put at risk over 25 years, as waste moves past homes, workplaces, recreational areas, schools, and hospitals. The map below shows the routes that would most likely be used to transport the waste.



Where is Yucca Mountain?

Yucca Mountain is located in Nevada, about an hour northwest of Las Vegas. Located in a desert landscape, its public lands include part of the Nevada Test Site and Nellis Air Force Base. However, the entire area is part of the Western Shoshone people's traditional homelands, as recognized by the U.S. government when it signed the Treaty of Ruby Valley in 1863. If a dump is built at Yucca Mountain, the Shoshone will lose access to a place they consider sacred.

What Can I Do?

- ✎ Write to your Members of Congress and tell them that you do not want high level nuclear waste to travel through your community. You can use the sample post card text below, or write one in your own words, telling your Representative and Senators your concerns. Send your note on a post card depicting a local scene if you can to drive home the point that you're a voter in their next election.
- ✎ Host a letter-writing party and have your friends and family write letters or postcards, too. Remember, the more calls, post cards, letters, and faxes your Members of Congress receive, the more likely they are to take your concerns seriously.
- ✎ Also, if you belong to a group yourself, put an article in the newsletter, make an announcement at a meeting, or arrange to have a speaker address your group on this issue.
- ✎ If you are a teacher, have your students make posters or design their own postcards to send to your Representative and Senators.
- ✎ Contact us (see back of flyer) for more flyers or other materials, or to arrange a presentation to your group.

Dear Rep./Senator _____

I do not want high level nuclear waste travelling through my hometown!

The risks of nuclear waste transportation are high, and I am worried that my local emergency responders are not prepared to deal with a nuclear waste accident and that my property value will decline if I live on a transportation route.

Please OPPOSE any legislation that would put nuclear waste on our roads and rails.

Sincerely,
Your Name and Complete Address

Representative X
House of Representatives
Washington, DC 20515

OR

Senator Y
U.S. Senate
Washington, DC 20510

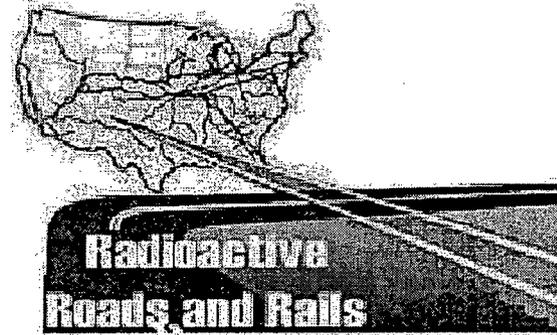


For more information, contact:

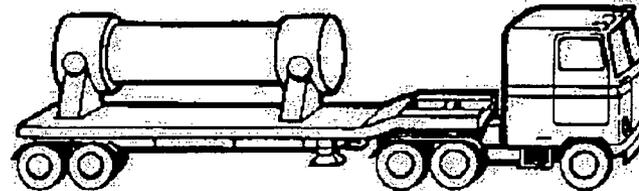
Public Citizen's Critical Mass
Energy and Environment Program
215 Pennsylvania Avenue, SE
Washington, DC 20003
www.citizen.org/cmep
202-546-4996
202-547-7392 (fax)

OR

Nuclear Information
Resource Service
1424 16th Street, NW, #404
Washington, DC 20036
www.nirs.org
202-328-0002
202-468-2183 (fax)



**Get the Facts on
Nuclear Waste
Transportation!**



What is the Time Frame for the Decision about the Dump and the Transportation of Waste?

The Department of Energy (DOE) is now in a "site characterization" phase, which means that it is performing tests at the Yucca Mountain site to determine its suitability as a site for the disposal of radioactive waste. If the DOE determines that the site is acceptable, it will apply in 2001 for a license from the Nuclear Regulatory Commission (NRC). If the license is granted, construction will begin in 2006. If all goes according to the DOE's plan, waste will be accepted at Yucca Mountain beginning in 2010 and will continue to arrive at Yucca Mountain for 24 years, with the final "emplacement" activities ending in 2035.

Where can I get more information?

If you have access to the World Wide Web, check out these sites:

Public Citizen's Critical Mass Energy and Environment Program

<http://www.citizen.org/cmep>

Nuclear Information Resource Service

<http://www.nirs.org>

Shundahai Network

<http://www.shundahai.org>

Citizen Alert

<http://www.igc.org/citizenalert/>

State of Nevada Nuclear Waste Project Office

<http://www.state.nv.us/nucwaste/index.htm>

Yucca Mountain Project Office (DOE)

<http://www.ymp.gov>

Nuclear Regulatory Commission

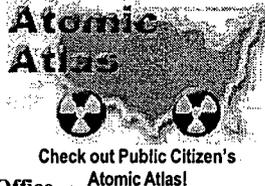
<http://www.nrc.gov>

EPA Yucca Mountain Homepage

<http://www.epa.gov/radiation/yucca/>

NRC/Sandia Labs Modal Study Page

<http://ttd.sandia.gov/nrc/modal.htm>



How much waste will go to Yucca Mountain?

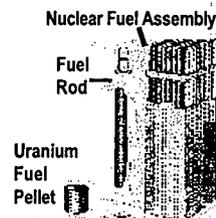
Under current law, 70,000 metric tons of waste (one metric ton is about 1.1 tons or 2200 pounds) would be allowed to be stored at Yucca Mountain, with 63,000 tons of that being commercial waste and the rest being DOE waste. However, that still would not accommodate all the waste projected to be produced by the time the repository opens (an estimated 107,500 metric tons of both commercial and DOE waste). This means that legislators would either have to change the law to allow more waste to go to Yucca Mountain, or open a second repository in another state (because they are unwilling to look at other solutions to the nuclear waste problem).

What is High-Level Radioactive Waste?

High-level radioactive waste is produced at commercial nuclear power plants and nuclear weapons production facilities. Nuclear fuel is made of pellets of enriched uranium, sealed in fuel rods, which are bundled together into nuclear fuel assembly. The fuel assembly powers the nuclear reactor until it is no longer efficient in generating electricity. The "spent" fuel is replaced about once a year. Spent fuel—which is highly radioactive—is the primary form of high-level nuclear waste.

Spent fuel is both thermally and radioactively hot, so irradiated fuel assemblies are placed in "spent fuel pools" to cool and allow some of the radioactivity to decay. Each reactor has only a certain amount of pool space, and when the pools are full, the reactors either must shut down or store some of the cooled spent fuel somewhere else.

A person standing one yard away from an unshielded, 10 year old fuel assembly, would receive a lethal dose of radiation (500 rem) in less than three minutes. A thirty-second exposure (100 rem) at the same distance, would significantly increase the risk of cancer or genetic damage.







REPROCESSING RADIOACTIVE WASTE

EXPENSIVE FOR TAXPAYERS / RATEPAYERS

EXTREMELY POLLUTING AND RISKY

INCREASES VOLUME OF RADIOACTIVE WASTES

To Call It Recycling Is Misleading!

Reprocessing Generates Much Larger Waste Streams.

DOE Estimates:

3 to 11 Times More Low-Level Radioactive Waste

163 Times More “Greater than Class C Waste”

Internationally, Reprocessing Has Been An Abysmal Failure

- ✓ France dumps 100 million gallons of radioactive waste into the English Channel every year.
- ✓ The United Kingdom has released over 1,000 pounds of plutonium into the Irish Sea.
- ✓ More than \$20 billion has been spent on the Japanese reprocessing plant, which failed to start after more than two years of attempts;

Dangers and Costs of Reprocessing Nuclear Waste

Reprocessing is not the solution to the nuclear waste problem. It has already been a very expensive boondoggle.

- ✓ Reprocessing is extremely expensive
- ✓ Extremely Polluting
- ✓ It would be a dangerous shift in U.S. global nonproliferation policy.

Reprocessing is the most polluting part of the nuclear fuel cycle.

Reprocessing would dramatically increase the threat from and complexity of dealing with nuclear waste from power plants. Rather than solving our nation’s nuclear waste problem, it actually makes more waste.

Reprocessing is NOT fiscally sound.

Lifecycle cost analysis for the program shows it is astronomically expensive. It appears no reprocessing program in the world has been commercially successful. Such a program in the United States would likely be paid for in full by U.S. taxpayers.

- According to a 1996 estimate by the National Academy of Sciences, reprocessing will “easily” cost taxpayers \$100 billion.
 - ✓ This estimate is only for existing U.S. irradiated fuel.
 - ✓ It does not include waste produced as a result of 20-year license extensions, waste from new domestic reactors, or the importation of foreign waste to the United States for reprocessing.
- U.S. taxpayers are still paying several billion dollars each year to clean up contamination from reprocessing programs in the 1960s and 1970s for nuclear weapons at the:
 - ✓ Hanford Site (WA)
 - ✓ Savannah River Site (SC) And for reprocessing of naval irradiated fuel at the
 - ✓ Idaho National Laboratory (ID)
 - ✓ Commercial reprocessing at West Valley (NY).
- The only commercial reprocessing site ever to operate in the U.S. is in West Valley, New York.
 - ✓ Projected clean-up costs for this site alone is more than \$5 Billion
 - ✓ Only a fraction of the nuclear waste was sent there between 1966 and 1972.
- Reprocessing was abandoned in the US for over 30 years.
 - ✓ France, Britain, and Russia are reaping hideous environmental legacies of contamination and disease from reprocessing.
 - ✓ Every processing site is a catastrophe, with massive releases of radioactivity to air, land, and water, high worker radiation exposures, and residues harder to handle than original wastes.
- Reprocessing is also a threat to U.S. nonproliferation efforts.
 - ✓ It would increase the likelihood that a terrorist could obtain fissile material to build a nuclear bomb
 - ✓ Materials, technical personnel, technologies and specialized equipment involved in these processes could leak out, as they have in the past, to foreign clandestine weapons programs or be diverted within a state’s program to make nuclear weapons.
- Reprocessing would NOT eliminate the need for a geologic repository – It’s NOT RECYCLING
 - ✓ Reprocessing actually increases waste volume and destabilizes nuclear wastes
 - ✓ It doesn’t reduce radioactivity – it actually spread radioactive contamination.
 - ✓ It would actually increase the number of radioactive waste streams to be managed.

DOE officials testified to Congress that they do not know whether the full complement of necessary technologies, including reprocessing, fast reactors, and fuel fabrication, would ever work or be economically competitive.

- Massive funding would be needed for:
 - ✓ Siting facilities
 - ✓ Completing Environmental Impact Statements
 - ✓ Soliciting commercial vendors
 - ✓ Ordering equipment for reprocessing, fast reactor, and fuel fabrication plants
- Reprocessing in France
 - France reprocesses spent nuclear fuel by soaking it in acid to extract plutonium and slightly enriched uranium.
 - ✓ This results in massive releases of radioactive gases and liquids that place people and the environment at great risk.
- Much of the so-called low-level – but highly radioactive wastes generated by reprocessing are discharged into the sea and air from LaHague on the Normandy Coast.
 - ✓ Discharges have been measured 17 Million Times more radioactive than normal sea water.
 - ✓ Liquid discharges have resulted in Contamination of area beaches and seen as far away as the Arctic Circle.
 - ✓ They may have contributed to elevated leukemia rates near La Hague.
- La Hague routinely releases radioactive gases into the air.
 - ✓ Kryptom-85 at levels thousands of times higher than natural radiation levels.
 - ✓ Carbon-14 that is the most damaging to human health.

Limerick Nuclear Plant Is Still NOT Guarded Against A 9/11 Type Terrorist Attack With Planes or Missiles

For many years ACE has been concerned that Exelon was not required to guard Limerick against a 9/11 type terrorist attack.

Attached information shows we have been trying to get NRC to evaluate the risk and require Exelon to guard against such an attack for many years.

Terrorists say they want to hit a nuclear plant. Limerick would be a prime target because of the dense population surrounding it.

- **Our first concern was about a plane or missile strike on hard to miss above ground casks, with army testing proving they can be penetrated with a missile.**
- **Since Fukushima, we realize Limerick's fuel pools are very vulnerable to such an attack. We also realize the devastation that could cause, dramatically making the urgency of guarding against a terrorist attack with an airplane or missile even more important.**

News articles show that the National Guard guarded Limerick Nuclear Plant for quite some time after 9/11, but when it came time for Exelon to pay, that stopped. In fact, Exelon cut back on security.

Given what is at stake, we believe NRC was negligent in failing to provide a risk assessment, including for terrorist attacks, related to above ground storage of high-level radioactive wastes at Limerick Nuclear Plant, one of the most heavily populated regions surrounding a nuclear plant.

- **ACE CALLS ON NRC TO PROVIDE A RISK ASSESMENT AS PART OF THIS UPDATED EIS, NOW NOT ONLY FOR CASKS, BUT ALSO FUEL POOLS.**



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The Mercury

Sunday

Pottstown, Pennsylvania

NRC: Dry casks not part of new 9/11 safeguards

By Evan Brandt
ebrandt@pottsmmerc.com

LIMERICK — When it comes to building new nuclear power plants, the nuclear industry has asked that it be required to design plants that can withstand a 9/11-type attack by a hijacked jet.

When it comes to dry cask storage facilities however, the industry, the federal government and even one of the nuclear industry's harshest critics do not have the same concerns.

One such dry cask storage facility is planned for Exelon Nuclear's Limerick Generating Station.

On Dec. 8, the Nuclear Energy Institute sent a widely referenced letter to Dale E. Klein, chairman of the U.S. Nuclear Regulatory Commission.

The letter, as reported in *The New York Times* and the *Associated Press*, asks the NRC to be sure to require designs for new nuclear plants to be adequate to protect against "conditions that result from large fires and explosions that challenge core cooling, containment, or spent fuel pool integrity."

In a Dec. 25 *Associated Press* report, Nuclear
(See SAFEGUARDS on A3)

JRC: New 9/11 safeguards not needed for dry casks

REGUARDS from A1)

ergy Institute spokesman Scott Peterson said you need to change the design to accommodate greater security, particularly for large fires and explosions, you want to do that up front in the design process, not after you build the plant."

Peterson also told the Associated Press that the threat from a hijacked airliner is not on the current list of threats against which a plant is required to be capable of defending itself.

In the wake of the 9/11 attacks on the World Trade Center and the Pentagon, the NRC did require existing plants to develop new, more stringent security procedures including ways to protect against an attack with an airplane.

The specifics of those procedures, called the "sign basis threat," are secret for obvious reasons.

What the industry has asked for is for the design requirements for new plants to be more stringent.

The Dec. 8 letter "asks nothing new or beyond what the NRC already has underway for new reactors," according to an NRC response dated Jan. 4 which explained that the additional regulation the industry was requesting is part of an on-going process for new rules the NRC is considering.

What neither the NRC or the industry addressed in the exchange, however, is whether standards for dry cask fuel storage facilities, such as the one planned for the Limerick plant, would also be upgraded to protect against a 9/11-type attack.

Pietro Pietrangelo, vice president of regulatory affairs for the Nuclear Energy Institute, said there was no reason to address changes in the cask storage regulations because they are

already adequate to protect against a 9/11-type attack.

"What we were trying to address in our letter was for new regulations to address the new issues to be on the front end and not have changes being made after designs were finished or construction begun," said Pietrangelo.

As for dry cask storage facilities, those regulations are newer and do not need to be updated, he said. "We know they're safe," he said.

NRC spokesman Neil Sheehan said NRC also has addressed the issue.

In a statement e-mailed to The Mercury, Sheehan wrote that a German manufacturer conducted tests on a particular dry cask design — not the one to be used in Limerick — which suggested the casks are resilient against an attack using hand-held missiles, particularly when the casks are surrounded by concrete.

However he added that "the NRC has not reviewed the experimental procedures nor commented on the test."

He said current NRC regulations must be able to "provide for the protection of public health and safety" against naturally occurring events including flying debris from tornadoes or hurricanes, floods and earthquakes.

Additionally, Sheehan wrote, the NRC has "conducted a series of comprehensive vulnerability assessments for dry cask storage systems, including consideration of ground assaults using various weapons and aircraft impacts."

He said the results of the assessments, conducted largely by using computer models, "indicate that it is unlikely that a significant release of radioactivity would occur from a ground assault or a large aircraft impact on a dry spent fuel storage cask."

The same result occurred in a separate 2002 study conducted for the NEI by the Electric

Power Research Institute, said NEI spokesman Mitch Singer.

That study focused primarily on the standards for existing nuclear plant buildings, but also came to the same conclusion for steel dry casks.

David Lochbaum is the director of the nuclear safety program for the Union of Concerned Scientists and a frequent critic of the nuclear industry's safety record.

Lochbaum said he does not consider dry storage casks to be the greatest risk at a nuclear plant under attack from a plane, although he does have some concerns.

"Generally, they're not anchored to the ground so they would be kind of like pins in a bowling alley and could get toppled or moved if a plane crashed there," Lochbaum said.

However, more vulnerable, Lochbaum said, are the spent fuel pools located inside the reactor buildings.

The dry cask storage facilities are erected once the spent fuel pool inside, used to cool the spent fuel for at least five years, nears capacity.

Dry casks are currently considered a temporary solution by both the industry and the NRC until the national fuel storage facility at Nevada's Yucca Mountain is completed.

Behind schedule, over-budget and opposed by Nevada Sen. Harry Reid, the new senate majority leader, Yucca Mountain's future is anything but certain however, Lochbaum said.

Because the pools hold so much more spent fuel than the individual casks and because Lochbaum considers the walls that surround those pools to be more vulnerable to an attack with an airplane than the casks themselves, he said the pools are the greater risk.

"The pools hold 1,000 tons of spent fuel but the casks hold only 10 to 20 tons," Lochbaum said. "If I'm a terrorist with a plane, I'm proba-

bly going to aim at the fuel pool instead of any casks."

That is where the federal government should direct its preventative efforts he said.

According to a position statement posted at the Union of Concerned Scientists site: "The 2005 Energy Bill contained potentially billions of federal subsidies for new nuclear reactors. But amid all the talk about building new nuclear power reactors, the majority of NRC's Commissioners voted against requiring new reactor designs to explicitly consider intentional aircraft crashes. Thus, new reactor designs have been developed accounting for bad guys who arrive on foot or by boat, but not by aircraft. It's as if the Wright Brothers never invented the aircraft or 9/11 never happened."

Elizabeth Rapczynski, spokesperson for Exelon's Limerick plant, disagreed with Lochbaum's assessment.

"We believe the technology used for both spent fuel pools and dry cask storage are equally safe and proven," she said.

One of the nation's newest nuclear plants, the Limerick facility received permission to erect its dry cask storage facility in July from the Limerick Board of Supervisors.

The supervisors had jurisdiction over only the land development aspect of the concrete pad on which the casks will sit.

All other regulation for the dry casks rests with the NRC. The NUHOM cask system Exelon has chosen for Limerick is pre-licensed by the NRC and no new permits were required for the project.

The NRC violation issued last year against a Japanese steel plant where Limerick's casks are being manufactured did not involve the casks that are being manufactured for Limerick.

NRC Refuses To Require Exelon To Guard Limerick Nuclear Power Plant Against Terrorists' Air Strikes or Missiles

NRC's Lax Security And Quality Assurance Requirements Jeopardize Our Entire Region

Storing deadly radioactive waste in this heavily populated region for potentially centuries, is a process that clearly needs more careful scrutiny than NRC is willing to provide.

The U.S. Nuclear Regulatory Commission Failed To Do An Independent Site-Specific Investigation On Limerick Nuclear Power Plant's Proposed Storage of High Level Radioactive Wastes Above Ground in Limerick, In Spite Of:

- ✓ Limerick Nuclear Power Plant is not protected against terrorist attacks by air strikes or missiles.
- ✓ The region around Limerick Nuclear Power Plant is one of the most densely populated.
- ✓ Railroad tracks run through the 449 acre property
- ✓ Limerick airport 1 mile away
- ✓ Pottstown airport 5 miles away
- ✓ The property is bordered by the Schuylkill River - highly easy access
- ✓ Only a handful of guards are expected to guard the 449 acre property
- ✓ Evidence suggests Wackenhut, Exelon's security company at Limerick is NOT reliable.
- ✓ Likely extremely corrosive air will be constantly cooling the steel holding Limerick's high-level radioactive wastes for decades, if not forever

To fail to fully protect us against all forms of terrorism is unacceptable. Paul Gunter of NIRS said "...NRC is more interested in protecting the nuclear industry's bottom line on security than requiring plant operators to meet the real cost of defending nuclear power plants from terrorism."

NRC's track record of rubberstamping nuclear industry permits with lax oversight and enforcement for cask quality assurance violations, accidents and incidents, calls for an independent review BEFORE casks are filled at Limerick. A detailed analysis of correspondence between ACE and NRC since April, 2006, shows NRC's irresponsible and unacceptable responses and conclusions.

Exelon's plan to add high level radioactive waste storage above ground in casks at Limerick raises numerous safety questions.

- Limerick's waste consists of rods, containing high level radioactive chemicals, hundreds of times a greater threat than that released at Hiroshima or Nagasaki.
- The rods contain radioactive chemicals which cancer causing and will not decay fully for thousands of years.
- A Canadian study shows over 211 Radioactive Poisons in 10-Year Old Spent Fuel

The following concerns have not been addressed satisfactorily by the U.S. Nuclear Regulatory Commission (NRC), responsible for nuclear plant safety oversight, in its June 16, 2006 letter of response to the Alliance for a Clean Environment.

1. Flaws in Cask Design. Dry cask storage of high-level radioactive waste is only 20 years old. Already accidents have raised doubt about cask quality and safety. A nuclear engineer raised questions about design flaws in casks planned for Limerick. NRC asked the company building

the casks to investigate. NRC refused to complete an independent investigation and instead asked the company building the casks to respond to our concerns.

2. Vulnerability to Terrorist Attack.

A 1998 experiment at the U.S. Army's Aberdeen Proving Ground in Maryland showed that a TOW anti-tank missile was able to pierce a grapefruit size hole through a dry cask with 15 inch thick cast iron walls (casks planned for Limerick are far less fortified). At Limerick Nuclear Power Plant, the presence of two nearby airports (one mile away and 5 miles away) and railroad tracks through the nuclear power plant property pose an added threat of terrorism. Recent reports from the 9/11 Commission and the National Academy of Sciences concluded that nuclear plants are inviting terrorist targets. Above ground casks holding this deadly waste are an additional, possibly more vulnerable target. NRC's failure to address specific vulnerability of casks to terrorist attacks at Limerick is dangerous and unacceptable.

3. Flawed Cask Location.

Exelon proposes to house the casks in a central location on the Limerick grounds. ACE, and other concerned citizens around the country, believe casks should be dispersed to reduce the impact of sabotage. In addition, casks should be placed under bunkers to further protect them. NRC ignores these added security measures.

4. Limerick as Permanent Storage Site

Dry cask storage at nuclear plants like Limerick is supposed to be temporary. Since 1982, the U.S. Energy Department has attempted to develop a permanent national waste repository. But their choice, the Yucca Mountain site in Nevada, is environmentally unsound and is now entangled in scientific and political controversy. Yucca Mountain will likely not open until 2020 at the earliest. More than likely it will never open. Thus, NRC needs to regard dry cask storage at Limerick as a permanent decision, not just a 20 year decision, but NRC refuses to do so.

5. Difficulty in Moving, Loading, and Unloading Casks.

It is quite difficult and time-consuming to move the extremely heavy casks, which are housed on platforms in containment units. To our knowledge loaded casks, after being stored for any length of time, have never been removed. Routine or emergency movement of casks would expose this flaw, but the NRC has failed to address this deficiency.

Threats from storing Limerick's high level radioactive wastes above ground in casks will only increase as the quantities of this deadly waste continue to accumulate in our heavily populated region. The current total of just under 1000 metric tons of high-level waste will rise to 2000 when the plant's license expires, and 3000 if the plant's license is extended (as the NRC is granting to many older plants). **In this heavily populated region, already overburdened with highly elevated rates of cancer and other illnesses, answers and actions that best protect the public are urgently needed from NRC.**

One NRC Commissioner, Gregory B. Jaczko, appears to understand the need for improved security against terrorist air strikes and missiles attacks. A news article and letter to him from ACE are attached. We urge you to contact him.

For More Information Contact The Alliance For A Clean Environment
(610) 326-6433

The Alliance For A Clean Environment
P.O. Box 3063 Stowe, PA 19464
(610) 326-6433

December 9, 2006

Gregory B. Jaczko, Commissioner
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Jaczko,

ACE supports and commends your position to improve security measures for nuclear power plants, as reported in an article by Matthew Wald published November 9, 2006.

The Alliance For A Clean Environment is a grass roots environmental group in PA, with members in the Montgomery, Chester, and Berks Tri-County Area. We are extremely concerned about failure to protect public health and safety against the threat of terrorist attacks by air strikes and missiles on the Limerick Nuclear Power Plant, which is one of the most heavily populated regions around a nuclear plant.

Common sense suggests precaution is key since safe evacuation of this heavily populated region is not likely. Limerick's fuel pools are full. There is so much high-level radioactive waste that a plan is well under way to store it above ground in casks, adding greater threat of disaster, with no site-specific investigation or updated environmental impact statement.

There's no safe solution for storing Limerick's deadly waste. We don't believe Yucca Mountain will, or should, ever open. Centralized interim storage in PA would increase transport risks to public health, safety, and security. Every time Limerick's deadly waste is moved our risk of a catastrophe increases. Comparing Limerick's fuel pools to above ground storage is a false argument. We'll always live with both.

ACE urges you to review the attached "*Principles for Safeguarding Nuclear Waste at Reactors*," developed by national public interest groups. If implemented, these principles would dramatically increase the safety of high-level radioactive wastes stored at Limerick Nuclear Power Plant and others. To discuss these principles, we urge you to contact Michele Boyd at Public Citizen, 215 Pennsylvania Ave SE, Washington, DC 20003 (202) 588-1000

After an intensive investigation into our threats from Limerick Nuclear Power Plant, ACE opposes building new nuclear power plants. We urge you review all the evidence which clearly shows nuclear power plants are a disaster-in-waiting. They are not the answer to our energy crisis or our global warming crisis, and have already produced a nuclear waste crisis. All facts considered, the financial and safety risks associated with new nuclear power plants show they should not be part of any plan to address our energy crisis or global warming.

Nuclear power is too polluting, too costly, and too dangerous. Please visit www.nirs.org

1. Nuclear power produces deadly, long-lived, high-level radioactive waste for which there is no safe solution.
2. Nuclear power plants regularly emit cancer causing radiation into our air and water.
3. The nuclear fuel chain produces significant green house gas emissions.

4. Nuclear power plants, as well as fuel pools and above ground casks storing their deadly wastes on site, are inviting terrorist targets.
5. The nuclear industry has had many near misses of accidental disasters in this nation.
6. Nuclear power is too high a risk and too high a financial burden on public money, as evidenced in the federal energy bill, with the nuclear industry the biggest beneficiary of \$13 Billion.

The unprotective and irresponsible position of the other NRC commissioners about improving protection for new nuclear power plants is one more reason to oppose the building of any new nuclear power plants. Our investigation shows NRC positions and policies have repeatedly ignored precaution and public safety, while protecting the bottom line of the nuclear industry.

With 103 nuclear reactors clearly already at risk in this nation from air strikes and missile attacks, I urge you to meet with members of the Union of Concerned Scientists, the Nuclear Information Resource Service, Radiation and Public Health Project director, and public advocacy groups such as the San Luis Obispo Mothers for Peace and The Alliance For A Clean Environment, to discuss the vulnerability of the nation's nuclear power plants that already exists and their deadly unprotected high-level radioactive wastes.

Thank you for speaking out to protect the public's interests.

Sincerely,



Dr. Lewis Cuthbert
ACE President

Cc: Senator Specter
Senator Elect Casey
Congressman Gerlach
Congressman Dent
Congressman Sestak

Agency Considers A-Plants' Vulnerability

By MATTHEW L. WALD

Published: November 9, 2006

WASHINGTON, Nov. 8 — With construction of many new nuclear reactors under discussion, the Nuclear Regulatory Commission is grappling with the question of whether they should be designed to withstand a Sept. 11-style airplane attack.

The commission has told its staff to study the vulnerabilities of the four new reactor designs, two of which it has already approved. But it has decided not to make the nuclear power industry meet security requirements any tougher than those for existing plants, which were designed before suicide airliner attacks, and even before the development of such airplanes.

Planes are not on the list of weapons that reactors must be prepared to survive. One of the five commissioners, has called for the panel to require design changes to reduce vulnerability, but the other four seem unpersuaded.

Speaking about protection against aircraft attacks, Mr. Jaczko said in an interview, "We've left it in the hands of Transportation Security Administration, the Federal Aviation Administration and the reactor vendors, who are building these plants, to do what they think is right in this area, and to me that's clearly not the answer."

"We should be requiring they design these plants to withstand such attacks," he said.

One of one of the four new reactor designs, called the European Pressurized Reactor, is advertised as being less vulnerable to planes.

The commission has required that operators of reactors that are already producing electricity plan what steps they would take in case of airplane attacks to mitigate the effect and minimize releases of radiation. Mr. Jaczko said that improving the new designs before concrete was poured could sharply reduce the number of "mitigating actions" the operators would have to take a plane attack.

But another member of the commission, Edward McGaffigan Jr., said, "We think we've done enough."

In analyzing security, nuclear engineers talk about multiple components that an attacker would have to reach and disable, which they call "target sets." New reactors, Mr. McGaffigan said, have "a terribly complex set of target sets that makes it highly improbable that a terrorist would succeed."

The commission should not make companies that want licenses to build and operate plants treat an airplane attack the way they would treat an earthquake, flood or other external threat for which they are already designed, he said.

A senior staff member of the commission said: "We want to be able to stand up to answer the logical question: 'Guys, did you look at the aircraft?' We want to be able to say yes, and we're confident that there is no issue, or if there is an issue, we've taken appropriate measures."

The staff member said the commission was stopping short of setting new requirements. He said he could not be identified because he was talking about matters that the five commissioners had not yet settled on.

At the Nuclear Energy Institute, the industry's trade association, Adrian Heymer, senior director for new plant deployment, said designers had analyzed existing plants and made many changes that cost little but made the new designs more difficult to attack. But, in general, Mr. Heymer said, protecting against terrorism was a government function.

"Refineries, tall buildings, those are the responsibility of federal government to protect," he said.

The commission is scheduled to meet on Thursday at its headquarters in Rockville, Md., to discuss licensing procedures for new reactors.

At the Union of Concerned Scientists, an advocacy group, David Lochbaum, a nuclear engineer, said that in the early 1980s the commission had convened outside experts to talk about hardening new reactors against plane crashes.

Industry experts, Mr. Lochbaum said, talked about some simple steps. For example, backup electricity generators could be positioned on two sides of the plant instead of in one place. Control rooms could be put in less vulnerable spots, and the pools that hold radioactive spent fuel could be hardened. The studies were classified after the attacks of Sept. 11, 2001, he said.

Representative Edward J. Markey, Democrat of Massachusetts, a critic of the nuclear power industry and the commission, says more should be done. In a statement, Mr. Markey said the commission should not only require design features to protect against airplane attacks but should also consider attacks by large truck bombs.

The commission has required substantial changes at existing reactors but has been reluctant to consider the threat of terrorism in the same way it handles other risks. For example, it has refused to consider the risk of terrorism in environmental impact statements, arguing that in contrast to earthquakes or mechanical failures, it does not know what probability to apply to attacks.

A California group, San Luis Obispo Mothers for Peace, won a decision in the United States Court of Appeals for the Ninth Circuit saying the regulatory commission must consider terrorism.

Pacific Gas & Electric, a California utility, has asked the Supreme Court to hear the case.

Related Articles

-  [Responsibility for Defending Nuclear Plants Is Debated](#) (April 5, 2006)
-  [Agencies Fight Over Report On Sensitive Atomic Wastes](#) (March 30, 2005)
-  [Metro Briefing | New York: More Preparedness Urged For Power Plants](#) (January 26, 2005)
- [National Briefing | Washington: Nuclear Agency Closes Part Of Web Site](#) (October 27, 2004)
- [Terrorism](#)
- [Nuclear Regulatory Commission](#)
- [Nuclear Energy Institute](#)
- [Union of Concerned Scientists](#)

Nuclear Information and Resource Service

1424 16th St. NW Suite 404
Washington, DC 20036
Tel. 202 328 0002 <http://www.nirs.org>

Armor Piercing Missile Perforates High-Level Radioactive Waste Storage/Transport Cask In U.S. Army Aberdeen Proving Grounds Test

The nuclear industry claims that on-site high-level radioactive waste storage casks are invulnerable to terrorist attack even by aircraft. Actual tests suggest otherwise.

On June 25, 1998 the U.S. Army conducted a weapons test depicting the vulnerability of on-site nuclear waste storage casks at nuclear power stations. The demonstration was conducted by International Fuel Containers, Ltd. (IFC) at the Aberdeen Proving Grounds in Maryland. IFC is the U.S. agent for *Gesellschaft für Nuclear-Behälter mbH* (GNB), a large German high-level radioactive waste cask manufacturer owned by Germany's nuclear utilities. The cask is GNB's dual-purpose CASTOR cast-iron cask, used for transport and dry storage of irradiated nuclear fuel. Some 600 of these casks are already in use worldwide including at the Surry nuclear power plant in Virginia. The test was conducted to promote an over pack system.

A video of the test shows a TOW armor piercing anti-tank missile warhead perforating the cask wall. TOW missiles are 5 inches in diameter, less than 4 feet long, and weigh less than 50 pounds. Launched from a portable tripod launcher it has an effective range of nearly two miles. TOW is the most widely distributed anti-tank guided missile in service around the world including the U.S. and 36 other countries. Iran may have obtained 1,750 or more TOW missiles according to the Military Analysis Network.

CASTOR is among the most robust of various models of nuclear waste storage casks in existence. It is licensed by the U.S. Nuclear Regulatory Commission for storage of irradiated nuclear fuel (high-level radioactive waste) in this country. A CASTOR cask has forged iron walls 15 inches thick. Despite this, as the video shows, the TOW missile blasted a hole completely through the wall. If irradiated nuclear fuel had been inside, a serious release of radioactive particles and gases would have occurred.

Rail-car sized casks like the CASTOR can hold over 200 times the long-lasting radioactivity released by the Hiroshima atomic bomb. A terrorist attack on a dry storage cask combining a TOW or another missile to ventilate a cask with a launched incendiary weapon could release large quantities of deadly radioactivity. A gaping hole shown in the video would also breach radiation shielding exposing any closely approaching emergency responders, such as fire fighters, to fatal doses of gamma radiation in minutes.

Other models of dry casks used in the U.S. are much less robust than the tested CASTOR design, having walls of only a few to several inches of steel. Although the casks are most often surrounded by a thick layer of concrete – originally designed as radiation shielding, not a “flak jacket” while storing high-level radioactive waste at

reactor sites, the Aberdeen test clearly shows that the radiation shielding could be obliterated by a TOW missile. Thus, high-level radioactive waste dry storage casks in the U.S. are vulnerable to terrorist attack.

The test was meant to demonstrate that IFC's concrete over pack system or "flak jacket" could absorb a missile or explosive attack, thus protecting the CASTOR behind it. The question, however, remains what if attackers came with more than one missile to destroy the flak jacket then penetrate the CASTOR with a second or third round? Moreover, how rigorously tested are other cask designs currently in use around U.S. reactors without over pack systems to similar attack? How vulnerable are they?

CASTOR casks are also designed to transport irradiated nuclear fuel by train or heavy haul truck. However, casks already weighing well over 100 tons each cannot be shipped with an even heavier concrete barrier. The test further demonstrated that "naked" shipment casks would be targets of opportunity to a missile supported terrorist attack.



Nuclear waste storage casks openly congregated at North Anna

The video was obtained by Congresswoman Shelley Berkley (D-Nevada) and released to ABC News to demonstrate how vulnerable high-level radioactive waste shipments would be to terrorist attack. Despite this demonstration, both the U.S. Senate and House of Representatives overrode Nevada's veto against the proposed Yucca Mountain national dump for high-level radioactive waste, paving the way for up to 100,000 shipments of high-level radioactive waste by truck, train and barge through 45 states and the District of Columbia.

Congress must investigate the circumstances of this weapon-on-cask test and order that similarly rigorous testing be conducted on all current and proposed high-level radioactive waste cask designs. Dry casks currently storing high-level radioactive waste must be fortified and bunkered against terrorist attack, or else industry and government must factor in the risk of a large scale release of radioactivity due to a terrorist attack that successfully ventilates a cask and then ignites the stored radioactive waste inside.

For further information contact NIRS.

The Mercury

06/22/2006

Court ruling could affect local nuke project

Evan Brandt, ebrandt@pottsmmerc.com

LIMERICK -- A federal court decision regarding the possibility of a terrorist attack on radioactive fuel stored at a California nuclear power plant could have an impact on a similar proposal here.

When Exelon Nuclear announced plans to store spent nuclear fuel rods in casks on the grounds of its Limerick Nuclear Generating Station, the Alliance for a Clean Environment raised some concerns.

High on its list was the possibility of a terrorist attack.

Advertisement

Among its suggestions for dealing with those concerns was fortifying the casks in bunkers, or scattering the casks around the site so they would not present one single target.

Apparently they were not alone.

For when Pacific Gas and Electric Co. announced its plans to store spent nuclear fuel rods in casks on the grounds of its Diablo Canyon nuclear generating station, a similar California group raised the same concerns.

The difference is that the California Group, Mothers for Peace, went to federal court. And, joined by the California Attorney General, they won.

In a 3-0 decision earlier this month, the Ninth U.S. Circuit Court of Appeals in San Francisco set aside the permit granted Diablo Canyon by the Nuclear Regulatory Commission.

The court said the NRC's argument that the threat of a terrorist attack was too remote to include in environmental planning, was undermined by the Bush administration's post-Sept. 11 statements and actions about the terrorist threat against those self-same plants, the San Francisco Chronicle reported.

According to the Los Angeles Times, the appeals court concluded it was unreasonable for the NRC to declare that "the possibility of a terrorist attack .. is speculative .. at the same time the government is spending time, effort and taxpayer money to combat the threat of terrorist attacks on nuclear power plants.

"The terrorist attacks of Sept. 11, 2001 have removed any shred of credibility from the NRC's stance that terrorist attacks on nuclear facilities are 'speculative' events that cannot be predicted," Diane Curran, the Washington, D.C., attorney representing Mothers for Peace, said in her oral argument in October, according to the Los Angeles Times.

"The ruling could have 'a very important impact' on other licensing decisions around the country, Edwin Lyman, a physicist and senior staff scientist at the Union of Concerned Scientists in Washington told the paper.

But whether that will prove true in Limerick remains unknown.

Beth Rapczynski, a spokesperson for Exelon, said her company's lawyers are "aware of the case and have read through the ruling."

She said the company "works hard to ensure all our projects meet NRC regulations and if the NRC chooses to change its regulations regarding this issue, we will, of course, comply."

Whether the NRC will change its regulations is, currently, another unknown.

Diane Screnci, a spokesperson for the NRC's King of Prussia office, said Wednesday the agency is reviewing the decision and

6/23/2006

has no comment at this time.

And should the NRC decide to alter its regulations as they apply to the Diablo Canyon site, it's possible that would still have no impact on the Limerick project.

That's because the NRC licenses spent nuclear fuel storage in two ways.

One license is specific to the site, as was the case in California.

The other method licenses the provider of casks. Called a "general license," this is the case in Limerick, which has hired Transnuclear Inc. to install its casks.

Even if the NRC decides not to appeal this most recent court decision, don't be surprised if it argues the decision does not apply to the Limerick storage site because of the difference between the types of permit, said Rochelle Becker.

One of the original "Mothers for Peace" and now with the California-based Alliance for Nuclear Responsibility, Becker said, "You should expect the NRC to try and wriggle out of anything they are supposed to do. That is their pattern."

In fact, Becker said she became so disgusted after dealing with the NRC that she changed her tactics and joined a group that argues the storage of nuclear fuel is a "states rights" issue and helped to craft a state law regulating radioactive waste now making its way through the California legislature.

Referring to the possibility of splitting the hair between a site-specific license and a general license, Becker said, "The most ridiculous thing about their argument is that a terrorist doesn't care about what kind of permit you have when choosing where to attack. The NRC has just refused to deal with this issue everywhere in the country and until they do, everyone's at risk."

And that's why, said ACE Vice President Donna Cuthbert, Exelon must be prevailed upon to install the most protective possible measures for the storage of its Limerick fuel.

"This is not just about Limerick and this is not just about our future," Cuthbert said.

"The decisions we're making today could have an impact on our grandchildren's grandchildren. Everyone who has these casks in their backyard should be asking the NRC these same questions," Cuthbert said.

She said she has already sent a letter to the NRC about her concerns and recently sent letters to the members of the Limerick Planning Commission and the Limerick Board of Supervisors, urging them to do the same.

Because its contractor has a general license, the only government permissions the power plant needs to begin construction on its storage project is local land development approval.

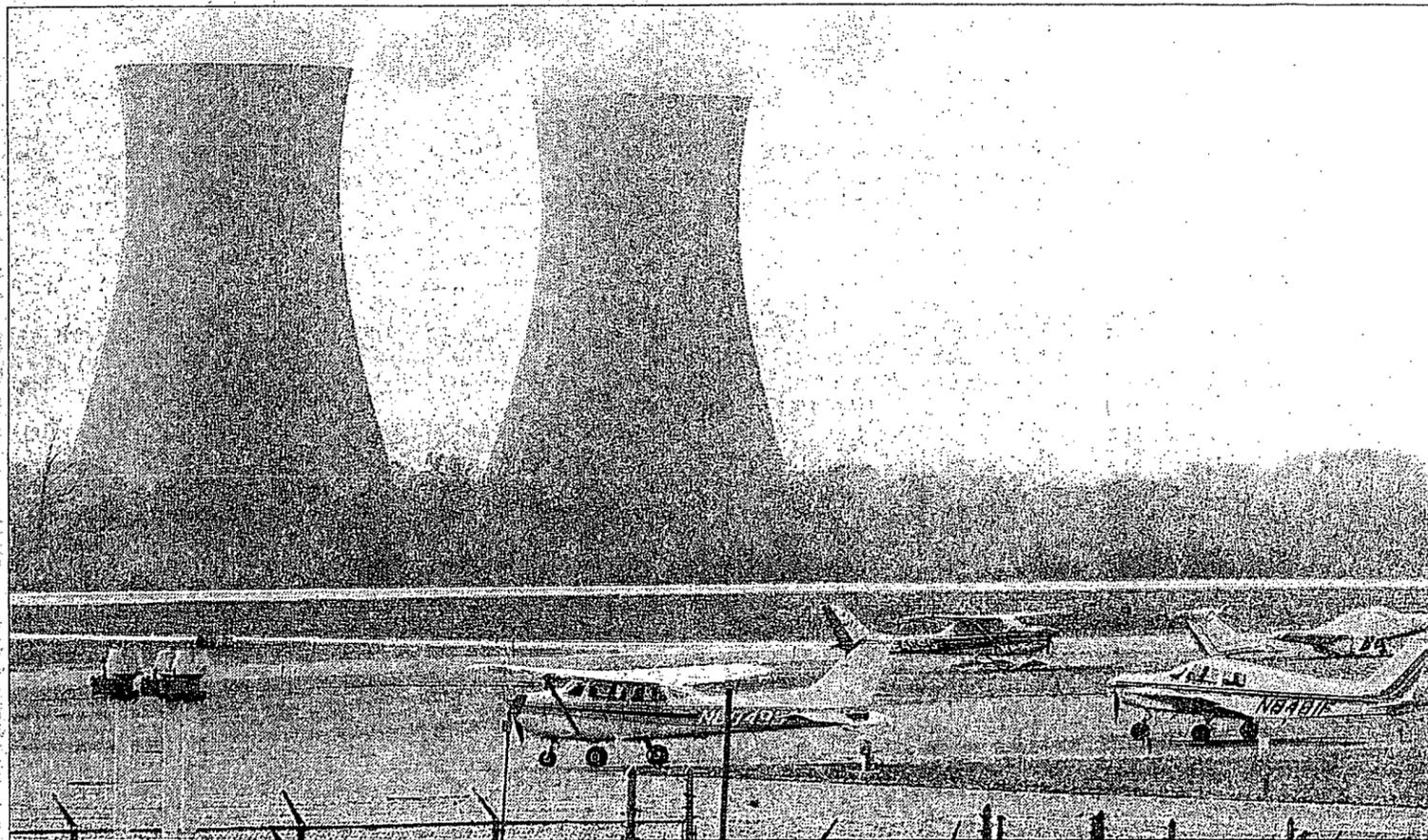
But that isn't going as smoothly as it might.

Last week, the Limerick planners had some questions of their own for Exelon officials, but they went unanswered. Citing security concerns, Exelon officials declined to provide information on their drawings for issues ranging from where current facilities are located to calculations for stormwater management.

So, according to Township Solicitor Joseph McGrory, the planning commission had little choice but to unanimously reject Exelon's application.

However, the planning commission is strictly a recommending body under Pennsylvania state law, and the final decision rests with the township supervisors.

According to the township Web site, the supervisors meeting is tonight at 7 p.m.



Mercury Photo by John Strickler

Airplanes sit tied down to the apron at Pottstown-Limerick Airport on Ridge Pike. The cooling towers of Exelon Nuclear's Limerick Generating Station are behind the airport. Smaller airports in close proximity to nuclear power facilities are closed or on a very reduced schedule.

Terror threats shut down local airports

By JOHN GENTZEL
Mercury Staff Writer

LIMERICK — Faced with threats of more terrorist attacks, the Federal Aviation Administration has shut down most small airplane activity in the vicinity of many of the country's nuclear power plants.

Issued early this week, the directive temporarily suspends most general aviation operations, corporate flights and other activities (including flight schools) at airports, several of

which are located in the looming shadows of Exelon Nuclear's Limerick Generating Station.

All general aviation flying is prohibited within a radius of 10 miles and below 18,000 feet of the 86 "sensitive nuclear sites." The ban on flying over these sites is in addition to previous flight restrictions the FAA has imposed throughout the country.

Governor asked to put troops at nuclear plants — A11

The ban does not affect most commercial flights, however, as they fly at higher altitudes.

Airports like the Pottstown/Limerick Regional Airport on Ridge Pike and the Pottstown Municipal Airport on Glasgow Street are operating under the restrictions.

Limerick Airport Operations Manager Chris Jordan said that certain parts of the airport's

(See AIRPORTS CLOSED on A3)

AREA ASSISTING

The newspaper and its parent company, Journal Register Company, through the nonprofit charity Journal Register Company Foundation, are helping raise money for the Red Cross Disaster Relief Fund in the wake of the Sept. 11 attacks.

RECENT CONTRIBUTIONS

Local Readers:	\$6,095.74
All JRC Readers:	\$28,057.85
JRC and Employees:	\$28,728.82
TOTAL:	\$56,786.67

TO CONTRIBUTE: Make check or money order payable to American Red Cross Disaster Relief Fund. MAIL TO: PO Box 1030, Pottstown, NJ 08607-1030.

For a list of all the ways to contribute to the fund, please contact the Journal Register Company at 1111 Pine Street, Pottstown, NJ 08607-1030.

Security beefed up at plant

By JOHN GENTZEL
Mercury Staff Writer

Officials say that a nuclear power plant's containment buildings are designed to withstand direct hits from tornadoes, hurricanes — or even a 707 jetliner — but what about an attack from something much larger?

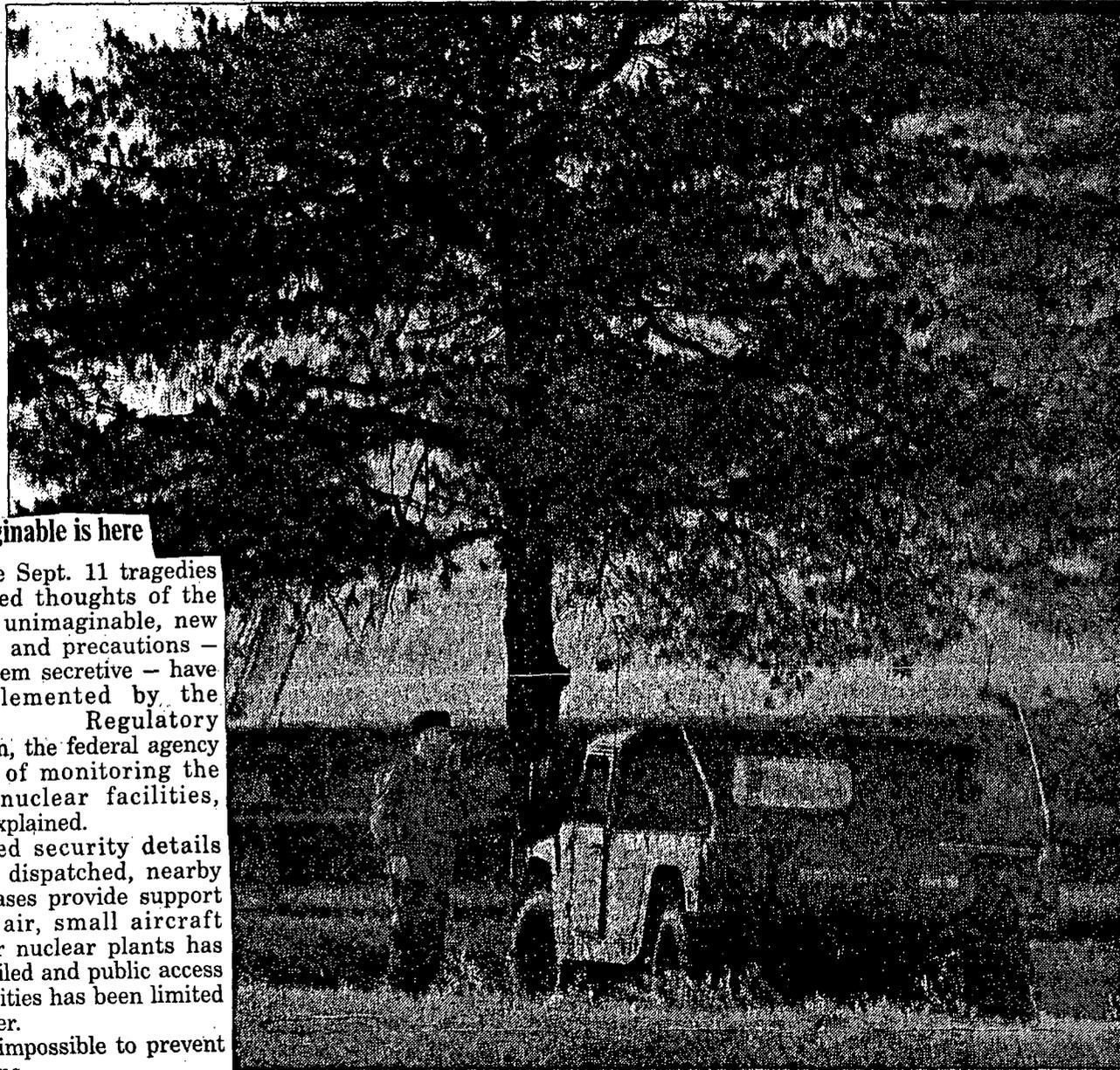
Yes, the building that contains the facility's nuclear reactors is ensconced in reinforced steel and cement, but what if an aircraft — say something like the 757s that toppled the World Trade Center buildings in New York — were to slam into a facility similar to the one in Limerick with a full tank of fuel and explode?

The results could be cataclysmic.

There would be no nuclear explosion and accompanying mushroom cloud (the uranium used to create bombs similar to the ones that destroyed parts of Japan during World War II was more pure than what is used to generate electricity in a nuclear power plant).

A very real scenario, however,

(See WHAT IF? on A3)



Mercury Photos by Daniel P. Creighton

Exelon Nuclear's Limerick Generating Station is under a heightened state of security due to possible terrorist threats. The FAA has created a 10-mile no fly zone around the site that effectively closed two area airports. The National Guard has also been dispatched to provide additional security at the power plant. Above, an armed National Guardsman watches the power plant property.

The unimaginable is here

Since the Sept. 11 tragedies that spurred thoughts of the previously unimaginable, new procedures and precautions — many of them secretive — have been implemented by the Nuclear Regulatory Commission, the federal agency in charge of monitoring the county's nuclear facilities, DeSantis explained.

Increased security details have been dispatched, nearby military bases provide support from the air, small aircraft flight near nuclear plants has been curtailed and public access to the facilities has been limited even further.

But it's impossible to prevent all situations.

Security beefed up at plant

(WHAT IF? from A1)

would be the massive escape of radioactive material into the air — similar to what happened in 1986 at the Chernobyl nuclear power plant in the Ukraine.

It would have to be an explosion of monumental proportions to trigger the release of Chernobyl-type radiation levels, as nuclear plants' containment buildings are "some of the strongest, sturdiest structures in the world," according to Exelon Energy spokesman Ralph DeSantis. Exelon Nuclear operates many nuclear plants including the one off Sanatoga Road in Limerick.

Security measures are in place essentially limiting all unauthorized access by land to many of the facilities, including Exelon's Limerick and Three Mile Island nuclear plants for example.

At Limerick, long windy roads, multiple check points and miles of fencing keep any unauthorized vehicles at bay, while a river — and accompanying security measures — help to keep the peace at Three Mile Island, which is located just outside of Harrisburg.

On site, highly trained and heavily armed security personnel patrol the plants, while licensed monitors keep track of the facility's reaction process to ensure things run smoothly. There are redundant back-up systems in place to support practically every accident or situation imaginable, DeSantis said.

Unfortunately, nuclear facilities were not designed with "acts of war" in mind, DeSantis conceded.

Chernobyl by comparison

A terrorist-guided airplane, full of fuel, will generate an explosion regardless of the reactor's design resulting in something similar to the intense fires that burned for days at Chernobyl, while emergency personnel helplessly watched radioactive materials seeped away into the Russian countryside.

Site of the world's worst nuclear accident to date, the Chernobyl meltdown killed more than 30 people, caused countless illnesses (reports of thyroid cancer are still rolling in) and essentially turned the land in more than a 100 mile radius surrounding the facility into an uninhabitable wasteland, as it remains today.

The Chernobyl facility was designed differently than the more sophisticated reactors found in the United States and the meltdown arose primarily from system flaws now accounted for in nuclear plants.

And to add to the concern, the plant's reactors are not the only dangerous targets in a nuclear plant.

Since the first one became operational, spent fuel — rods containing the uranium used in the reaction process — is kept on site. This is done primarily because there is no better place available yet (the federal government is in the final stages of testing and examining a Nevada mountain range as a location for the long-term storage of spent nuclear fuel) to store the waste material.

At nuclear facilities, spent fuel rods are usually kept at the bottom of large holding tanks, or pools of water. Roughly 30-foot-deep, the water serves to both control the heat generated by the rods and limit the amount of radiation escaping into the air.

If the water were to be drained from the pools for any given reason, the rods could overheat, triggering a massive release of radiation. Unlike the reactor building, the holding tanks are much smaller targets, and unlikely to be struck directly in the event of an attack,

How much is too much radiation?

Nearly every day, humans come in contact with radiation.

Whether it's flying (which brings people closer to dangerous atmospheric radiation levels), living in different types of housing structures (stone, brick and adobe have natural radioisotopes in them), smoking (the tobacco leaves are highly absorbent, collecting airborne isotopes of radon, for example), or sleeping next to someone overnight (exposure comes from the naturally radioactive potassium in the other person's body), there is plenty of radiation to be absorbed.

Annually, a person absorbs approximately 360 mrem (a mrem is a measure of radioactivity; 1 mrem is estimated to increase one's risk of dying from cancer by about 1 in 4 million) of radiation. The federal government establishes 5,000 mrem per year as the legal limit for radiation exposure for nuclear plant workers.

Looking only at acute doses, those received in a short amount of time, the biological effects of radiation begin to show at exposure to 10,000 to 25,000 mrem, with life threatening doses starting at 100,000 mrem and above.

The radiation is dangerous as acute doses at high levels can damage tissues and cells to the point where regeneration is all but impossible. At Chernobyl, enough radiation escaped into the air to kill people shortly after the accident and cause thousands of problems with cancer in the days, months and years that followed.

If Chernobyl levels of radiation seep into the air, all the security procedures, safety precautions and secretive measures in the world could not prevent the cataclysmic changes to our community and way of life.

John Gentzel's e-mail address is jgentzel@pottsmmerc.com

Nuclear plant 'in a heightened state of security awareness' after attack

By JOHN GENTZEL
Mercury Staff Writer 9-12-01

LIMERICK — As terrorist attacks ravaged Washington D.C., and New York City early Tuesday morning, local officials were working to calm residents' fears of a similar strike occurring at the area's largest, most visible target — Exelon Nuclear's Limerick Generating Station.

Early Tuesday, terrorist-hijacked planes crashed into the highly visible World Trade Center in New York City and the Pentagon in Washington, D.C., killing and injuring thousands.

Although no security breaches or terroristic threats were reported locally, the nuclear facility in Limerick, with its 500-foot-high cooling towers, is an immediate target based solely on its immense size.

As such, the power station located off Longview Road was "in a heightened state of security awareness," plant spokeswoman Lisa Washak said.

Exelon Nuclear corporate spokeswoman Dana Fallano said all support personnel and administrative employees not needed to run plant operations were sent home Tuesday afternoon as a precautionary measure.

If an airplane were to crash — either deliberately or otherwise — into the Limerick station, the facility, while it may sustain damage, is designed to withstand a direct hit from an airliner or a comparable natural disaster, like a hurricane or tornado, Fallano said.

"They're extremely robust structures," she added.

The walls of the containment building, which houses the facility's nuclear reactors, are built with thick layers of concrete to survive such an attack.

Although she could not explain the specific measures in place to ensure the public's safety, Fallano said, "we're reacting as we would under any emergency situation."

The Nuclear Regulatory Commission — the federal agency governing all nuclear facilities — recommended Tuesday that all of the nuclear power plants, non-power reactors, nuclear fuel facilities and gaseous diffusion plants go to the highest levels of security.

"And we are in direct contact with the NRC," Fallano added. "We also have groups working in contact with local officials."

Officials like the Limerick Township Police Department

fielded calls and question from concerned residents all day.

"We've had a lot of calls coming in from citizens with questions about the generating station," said Limerick Police Chief Doug Weaver. "Some believed that the streets and highways were closed because of the plant, and, well, that's just not the case."

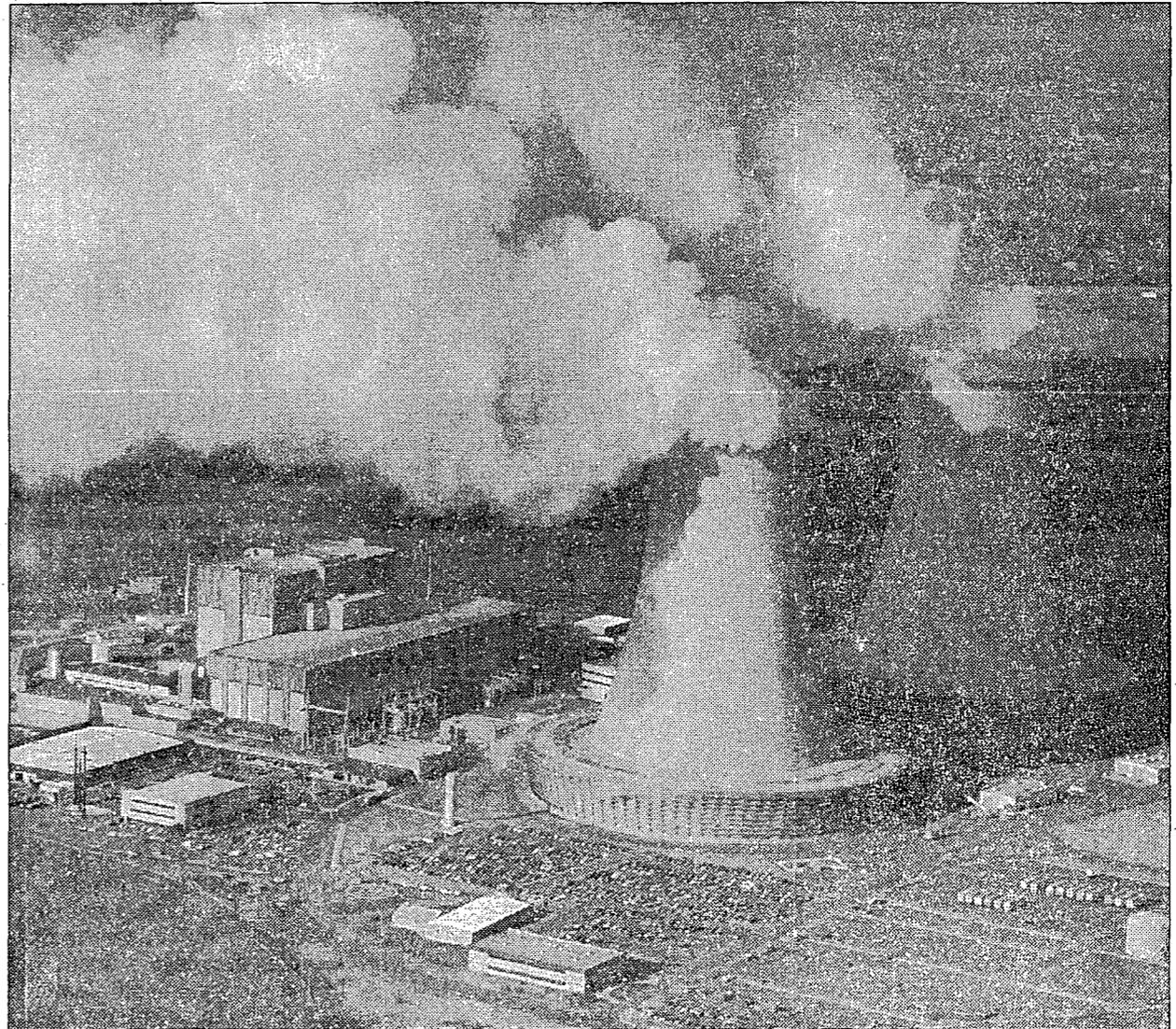
While Limerick's police department is the primary unit in the area, the nuclear station has its own complement of security personnel and its own list of security procedures, Weaver said.

"They have their own protocol that they follow," Weaver said. "They have armed, uniformed guards out there."

As for the thoughts that National Guard units might be called out to assist with the security measures in Limerick, "I can dispel that as an untrue rumor," Weaver said.

All of Exelon's nuclear plants — except Peach Bottom's Unit 3 reactor that happened to be shutting down for scheduled outage — continued to operate at full capacity Tuesday, Fallano said.

John Gentzel's e-mail address is jgentzel@pottsmmerc.com



Mercury file photo
As terrorist attacks ravaged Washington D.C., and New York City early Tuesday morning, local officials were working to calm residents' fears of a similar strike at Exelon Nuclear's Limerick Generating Station. A plant spokeswoman said that the power station was "in a heightened state of security awareness."

Security at nuclear plants gets another look

The chance of a terrorist attack on area reactors is remote, officials say. Still, procedures are scrutinized.

By Marc Schogol
INQUIRER STAFF WRITER

The attacks on the World Trade Center and the Pentagon have caused operators of nuclear power plants in the Philadelphia region and across the nation to reconsider their own vulnerability, a spokesman for the Nuclear Regulatory Commission said yesterday. Just last week, the head of the com-

mission urged Pennsylvania and other states to consider deploying the National Guard or state police to supplement the private guards who now protect nuclear plants. Wackenhut Corp. guards patrol plants at Limerick, Three Mile Island and Peach Bottom in Pennsylvania, and at Oyster Creek in New Jersey, commission spokesman Neil Sheehan said.

Regulators say the odds of such a direct hit are remote. A week after the terrorist attacks, at an annual meeting of the International Atomic Energy Agency in Vienna, agency spokesman David Kyd noted that reac-

See **NUCLEAR** on B2

Security security plans

NUCLEAR from B1

tors are far smaller targets than the Pentagon or the World Trade Center and said it would be extremely difficult for a terrorist to crash a plane at an angle that could set off a major radiation release.

Sheehan said that until Sept. 11, the agency had never considered or planned for the possibility that terrorists would crash jetliners into nuclear reactors. The plants' containment structures are formidable — three-to-four-foot-thick reinforced concrete wrapped around a one-inch steel liner, and a six-inch-thick steel fuel vessel. But Sheehan said they "clearly were not designed with 757s and 767s, which crashed into the World Trade Center, in mind. ..."

"These are civilian power installations," he said. "They were not designed to withstand acts of war."

If there were a direct hit on a reactor, Sheehan said, the worst-case scenario would not be like

an atomic bomb exploding but would be an extended release of deadly radiation, like the meltdown in Chernobyl in the Soviet Union in 1986, which eventually caused 4,000 deaths.

Pennsylvania's 1979 reactor accident at Three Mile Island would pale by comparison, Sheehan said.

"No one has done an analysis to find out exactly what would happen," he said. "It would depend how much fuel was on board [the plane], how fast it was going. The concern is the fuel in the reactor at the time, as with Three Mile Island. They would not be able to keep it covered and cooled, and we could have a massive release of radioactivity into the environment."

Since Three Mile Island, numerous safety measures have been implemented in the nuclear power industry, he said, and security was beefed up even more following the 1993 truck bombing of the World Trade Center.

A meeting on emergency procedures at the Limerick reactor in Montgomery County and Peach Bottom in York County, scheduled before the Sept. 11 attacks, was held yesterday at the commission's regional offices in King of Prussia. Outside the meeting, reporters raised security issues with Exelon, the company formed by last year's merger of Peco Energy Co. and Unicom Corp. of Chicago.

Exelon owns or runs the two plants and two others in the region: Three Mile Island in Middletown, Pa., and Oyster Creek in Forked River, N.J. It is also a part-owner of the Salem (N.J.) Nuclear Generating Plant with Public Service Electric & Gas Co.

A spokesman for Exelon said access to the plants was severely restricted and enforced by Wackenhut guards.

The spokesman, Ralph DeSantis, said many of those guards are former law enforcement or military personnel who have undergone rigorous training and met high standards.

Recognizing the need for increased security, commission chairman Richard Meserve wrote last week to the governors of the 40 states with nuclear power plants and other nuclear facilities.

"While there have been no credible threats against nuclear installations," Meserve wrote, "in the current situation it would make sense for liaison to be established between nuclear facilities and state authorities in the event state-supplied augmenting security elements might be needed."

calls itself the largest operator of nuclear plants in the country — and the commission said all aspects of protecting nuclear power facilities are under review at the highest levels.

"We first of all believe that our robust emergency-protection plan provides a solid foundation to respond to unforeseen events," said Jeffrey A. Benjamin, Exelon's vice president for licensing and regulatory affairs.

But, Benjamin said, "we are dependent on the federal government to protect us in the event of acts of war."

Hubert J. Miller, the commission's regional administrator, said, "We're sensitized by recent events. Security at all plants has been raised to the highest levels — not with the idea of any specific threat, but just to be ready."

Sheehan said terrorism such as the Sept. 11 attacks was never anticipated when nuclear reactors were being built, mostly in the 1960s and '70s.

"Hurricanes, earthquakes, natural disasters — the plants were designed to be robust enough to withstand all sorts of impact," including the impact of airplanes, he said. "However, at the time they [the plants] were designed, planes were smaller. ... The [Boeing] 707 was about the biggest, and the 767 is nearly double the size."

If a plane that large were to hit a reactor, Sheehan said, "there's going to be radioactivity. There are too many variables to really say exactly what's going to happen."

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Officials of Exelon — which

Exelon seeks to cut costs in planning for emergencies

By GEORGE STRAWLEY
Associated Press Writer *6/2/01*

HARRISBURG — The nation's largest operator of nuclear plants wants to cut emergency planning staff at its three Pennsylvania stations, including one in Limerick, and move an operations center for the Three Mile Island plant in order to save money.

Exelon Corp. has proposed cutting 23 of the 53 planning positions for its Three Mile Island, Limerick and Peach Bottom generating stations.

The Chicago-based company formed by the merger of Philadelphia's PECO Energy and Chicago's Commonwealth Edison is also asking the federal Nuclear Regulatory Commission for permission to move its emergency operations facility for Three Mile Island about 57 miles east from Harrisburg to Coatesville and increase the response time for certain personnel to be in place at the center in an emergency.

Emergency operations facilities are located at least 10 miles away from a plant and serve as headquarters for decision-makers in the event of an accident. They were established at the urging of a presidential commission that investigated the nation's worst commercial nuclear accident, which took place at Three Mile Island in March 1979.

Coatesville, which is near Exelon's mid-Atlantic headquarters, is the site of a combined operations center that serves the Peach Bottom and Limerick plants.

Three Mile Island is located near Middletown, about 10 miles south of Harrisburg. Peach Bottom is located just north of the Maryland state line, about 58 miles west of Philadelphia, and Limerick is 21 miles northwest of Philadelphia.

A spokesman for the Nuclear Regulatory Commission, which will decide on the request, called the changes "significant." Of special concern was the proposal to lengthen the response time for emergency center personnel from 30 minutes to 60 minutes, NRC spokesman Neil A. Sheehan said.

Exelon has already consolidated its emergency-response operations for plants in the Midwest, reflecting a trend within the nuclear industry, Sheehan said.

A representative of a watchdog group that monitors Three Mile Island said the proposal "demonstrates the worst aspect of deregulation."

"In the event of an emergency, you would like to be able to plan the response from a location that has the same area code," said Eric Epstein, president of TMI Alert. "Right now, we have a state-of-the-art planning facility outside the 10-mile zone. It's well-equipped to handle a dedicated emergency at TMI."

At Three Mile Island, the company was considering eliminating 11 positions, with six each to be cut within the Peach Bottom and Limerick teams.

The combined cuts included three specialists who can calculate dosages of radiation exposure and five workers who would check for radiation releases outside the plant, as well as personnel responsible for administration, maintenance, security and public relations.

Company officials said the consolidation would improve training and standardize operations at the three plants.

Exelon presented its plan to the NRC during a May 16 meeting and expects to submit a formal proposal by the end of the month.

Pennsylvania officials found some ideas in the plan to be good ones but have not passed final judgment on the proposal, said Marko Bourne, a spokesman for the Pennsylvania Emergency Management Agency.

"We have some questions and some technology concerns that we want to address," Bourne said.

John Hanger, a former Pennsylvania utility regulator who now heads an environmental and consumer advocacy group, said Exelon should have a heavy burden to prove that the consolidation will not reduce safety.

"I'm personally skeptical that Exelon could meet that burden," Hanger said. "The investments in safety shouldn't be cut, especially this significantly, without the highest levels of proof that there is no impact."

RADIOACTIVE WASTE TRANSPORTATION CALLED A "MOBILE CHERNOBYL"

FACTS IN THIS REPORT COMPILED BY ACE SHOW WHY
April, 2011

This Report Was Compiled By ACE For A PA Senate Program

Legislation Was Discussed In PA In 2011 To Transport Nuclear Waste Across All Municipal Borders And Take Away Public Rights To Say No. The bill would have prohibited PA municipalities from approving any ordinance, rule, or regulation that prohibits transportation by rail, road, or water of any nuclear waste products through their municipal borders.

THIS REPORT SHOWS WHY HIGH-LEVEL RADIOACTIVE WASTE TRANSPORTATION IS TOO GREAT A RISK

- 1. Nuclear power plant waste consists of high-level radioactive wastes that are among the deadliest materials on Earth. They are both thermally and radioactively hot decades after removal from fuel pools, making transport extremely dangerous.**
 - Transporting hundreds, possibly thousands of high-level radioactive waste trucks and trains through PA communities is an unacceptable, unnecessary risk to millions of PA families, resulting in potentially devastating accidents and/or terrorist attacks.
 - ✓ Each fuel assembly contains 10 times the long-lived radioactivity released by the Hiroshima bomb.
 - ✓ Trucks contain 1 to 4 fuel assemblies.
 - ✓ Trains contain up to 24 fuel assemblies.
 - Accidents will happen.
 - ✓ DOE estimates that at least 50 accidents could occur during shipments of the nation's radioactive wastes.
 - ✓ The more severe the accident, the more radiation would be released to the environment.
 - ✓ Even a low speed accident could unseat a valve or damage a seal, releasing radioactive particulates to the environment.

- ✓ It could also crack brittle metal tubing around the fuel.
 - ✓ The American Petroleum Institute says at least 15 accidents are expected each year with thousands of truck shipments.
 - ✓ Some studies on spent fuel show the kind of damage that can be done by a nuclear fuel disaster during transport.
 - ✓ NRC studies are woefully inadequate and deceptive when they claim nuclear waste transport is totally safe.
- **FIRES associated with truck or rail accidents increase the probability of radioactive releases from nuclear wastes transported.**
 - ✓ If a truck or train accident resulted in fire, spent fuel rods could "heat up, self-ignite and burn in an unstoppable fire." Numerous scientific experts warn that burning fire on zirconium cladding of nuclear waste can trigger an exothermic reaction.
 - ✓ Shipping containers are only designed to withstand a 1/2 hour fire at a temperature of 1475 degrees. NEI's inadequate testing was only 90 minutes at 2000 degrees.
 - ✓ Rail fires could burn for hours, sometimes days, at temperatures considerably higher.
 - ✓ Heat could vaporize some of the radioactive materials and sweep them up into the air.
 - ✓ Persons downwind can inhale radioactive particles and later develop cancer or genetic defects.
 - ✓ It's important that fires are extinguished within 1/2 hour, yet there is often confusion about who has responsibility for cleanup and protecting public health in a radioactive emergency.
 - ✓ There is real potential for fire resulting from a transportation accident involving high-level radioactive wastes, which could have similar consequences as radiological weapons.
 - ✓ Fires could be caused by many things during nuclear waste transport by truck or train, both by accidents and terrorists.
- **Terrorists Attacks**
 - ✓ Transport casks are vulnerable to terrorist attacks with planes or missiles from afar, and/or bombs ignited on transport vehicles, causing fires that will release radiation. Some call transport it a potential "Mobile Chernobyl".
 - ✓ Army testing proves transport casks can be penetrated with a missile.
 - ✓ Jet plane fuel from a deliberate crash into a transport vehicle could cause a devastating fire, even with a small plane.
 - ✓ The largest casks carry the equivalent of some 200 Hiroshima bombs in a long-lived radiological equivalent.
- **Lax Security Documented**
 - ✓ Evidence that "Waste Trains" are not protected from terrorists, "**Security Breach on Nuclear Waste Train.**" 4-30-02 Durham, N.C.
 - ✓ Inmates Jump Wrong Train, Revealing Vulnerability.
 - ✓ Terrorists would not have boarded the train unarmed.
 - ✓ If these people intended to cause serious harm, they were in perfect position.
 - ✓ Defenders did not deny access.
 - ✓ If those who boarded the train had been attackers carrying explosives who were willing to sacrifice their lives, there could have been a serious problem.
 - It is absurd for the nuclear industry to suggest that their wastes are self-protecting due to exposure to radioactivity. This ignores reality, including the real potential for air strikes and missile attacks.

2. **INCIDENTS / ACCIDENTS ALREADY HAPPENED**

- 72 transport "Incidents" and accidents were documented by Nevada Agency for Nuclear Projects - "*Reported Incidents Involving Spent Fuel Shipment, 1949 to 1996*"
- "Incidents" can be quite significant, according to Dr. Marvin Resnikoff's 1983 book, "*The Next Nuclear Gamble: Transportation and Storage of Nuclear Waste...*"
 - ✓ One incident led to radiation contamination of hundreds of miles of PA Highways in 1981. It went unreported for 5 days. NRC never took action.

3. Local elected officials should have a right to say no to the transport of deadly wastes through their communities when it could seriously jeopardize health and financial interests of their entire region.

- DOE reports size of region impacted for public health and safety along transportation routes:
 - ✓ 50 Miles (80 kilometers) for Accident Conditions
 - ✓ .5 mile (800 meters) on either side of the transportation right of way (non-accident conditions).
- DOE estimated a severe accident involving 1 radioactive waste cask, releasing a small amount of radiation, would:
 - ✓ Contaminate about 42 square miles for well over 1 year, with devastating economic consequences in an urban setting.
 - ✓ A period greater than 1 year to attempt to clean up radioactive residue.
 - ✓ NRC 1980 study estimated economic consequences at \$2 Billion.
- Radiation dose from an accident or terrorist attack breaching transport containers (1 yard away) could result in:
 - ✓ A lethal radiation dose (500 rem) in less than 3 minutes
 - ✓ Significant increased risk for cancer or genetic damage in just 30 seconds (100 rem)
- NRC's pamphlet says 10 years after waste is removed from reactors, an unshielded radiation dose could exceed 20,000 rems per hour.
 - ✓ 5,000 rems can cause incapacitation and death within a week
- Thermal Images of Traveling Nuke Wastes Suggest You Wouldn't Want To Get Stuck In Traffic Anywhere Near One.
 - ✓ Traveling nuclear waste casks could emit significant radiation.

4. INJUSTICE - The nuclear industry is promoting unjust legislation that seriously jeopardizes the public's rights, safety, public health, and financial interests.

- Many Jurisdictions Officially Opposed Nuclear Waste Transportation Through Their Communities,
 - ✓ Including Philadelphia, Bucks County, and Falls Township in PA.

The state should not take away the right of communities to protect their residents. Given the unthinkable risk of health and financial devastation involved, it's not only unfair, it's immoral and unethical.

- At stake - health and potential total loss of homes and all possessions for generations.

- Property values decline along nuclear waste routes, a fact verified in 5 states, by damages for reduced property values
 - ✓ Residents should not be "stuck" with property that they can't sell along a nuclear waste transportation route.
 - ✓ Most states have disclosure laws, requiring buyers to be told.
- Insurance Does Not Cover Radiological Incidents or Accidents:
 - ✓ Homeowners insurance will not cover loss of real estate use or personal property caused by radiological accidents.
 - ✓ Health insurance would not cover your long-term or permanent radiological damage or other long-term serious illnesses caused by a nuclear accident.
- PA residents are especially vulnerable to high-risk, high-level radioactive waste transport accidents or terrorist attacks because PA has the 2nd highest number of nuclear plants and high-level radioactive waste in the nation.
 - ✓ PA communities would be exposed to large amounts of nuclear waste in all too frequent shipments as long as nuclear plants continue to operate and build up piles of deadly radioactive wastes.
- Communities gets risks - Nuclear industry gets benefits.
 - ✓ Once the waste leaves the site, the public has all the financial responsibility to store this deadly waste for an eternity.
 - ✓ EPA set a million-year health standard.
 - ✓ Why should taxpayers have to foot the bill for any problems caused by the nuclear industry's deadly wastes?
- It is outright deception for nuclear industry supporters to assert that transport to another location will remove risks at nuclear plants.
 - ✓ As long as nuclear plants operate, this deadly waste will keep piling up in fuel pools and casks.
 - ✓ Transport won't reduce the number of radioactive waste sites, it just adds enormous risk to the already unprecedented threats from high-level radioactive wastes.

5. LEAST BAD SOLUTION: STORE IT ON-SITE "SAFER"

➤ And STOP MAKING IT!

- There is no safe way to store this deadly waste.
 - ✓ Evidence shows we don't need and can't afford dirty, dangerous, and costly nuclear power and its deadly waste.
 - ✓ Solar, wind, geothermal, and other renewables are ready right now, don't create these kinds of risks, and are cheaper than nuclear power if all costs to the public for nuclear power are included.

NOTE: An Accident or Attack on Traveling Nuclear Waste Casks Could Emit Significant Radiation. An Accident Involving 1 Radioactive Waste Cask, Releasing a Small Amount of Radiation:

According to DOE

- ✓ Size of Region Impacted Along Transportation Route 42 Square Miles - 50 Miles for Accident Conditions
- ✓ Attempted Clean-Up Would Take Over 1 year
- ✓ Economic Consequences Would Be Devastating

According to NRC

- ✓ Estimated Economic Consequences \$2 Billion (1980 Study).



For more information, contact:

Public Citizen's Critical Mass
Energy and Environment Program
215 Pennsylvania Avenue, SE
Washington, DC 20003
www.citizen.org/cmep
202-546-4996
202-547-7392 (fax)

OR

Nuclear Information
Resource Service
1424 16th Street, NW
Washington, DC
www.nirs.org
202-328-0002
202-468-2183 (fax)



Get the Facts on PROPERTY VALUES and Nuclear Waste Transportation!

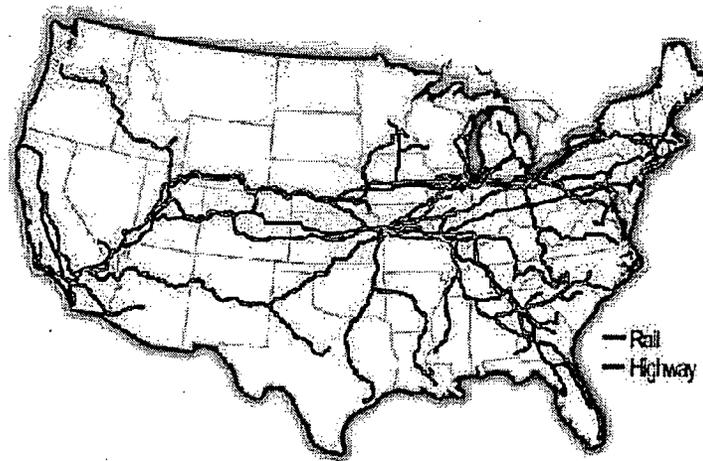
Why will nuclear waste be travelling through my state?

Yucca Mountain is the only site being considered by the Department of Energy (DOE) as a "permanent disposal" site for the United States' highly radioactive nuclear waste. This spent nuclear fuel and high-level waste is currently located at 77 sites across the country and would have to be transported by truck or rail to Yucca Mountain if that site is approved as a nuclear dump.

Several thousand shipments of nuclear waste would travel through 43 states—past the homes of 50 million Americans for 25 years.

Experience has shown that property values decline significantly along nuclear waste routes. Using the Department of Energy's own data, it can be

estimated that between 70 and 310 accidents and over 1000 incidents would occur during the nuclear waste shipping campaign if trucks are used as the preferred mode, and between 50 and 260 accidents and over 250 incidents if trains are used as the preferred mode. The Department of Energy also estimates that a severe accident in a rural area releasing a small amount of radiation would contaminate 42 square miles for well over one year. A similar accident in an urban area would have devastating consequences to the economy and public health.



Disclosure Laws Require Buyers To Be Told If Property Is On A Transportation Route

Most states require that potential property buyers be informed if the property for sale is located on a potential nuclear waste transportation route. This means that even if nuclear waste isn't already traveling past your home, your property value may decrease. Residents should not be "stuck" with property that they cannot sell along a nuclear waste transportation route.

Other lawsuits similar to the Komis case include a class action lawsuit by 50,000 Coloradans against Rockwell International for \$550 million in reduced property values, and lawsuits by neighbors of the Oak Ridge plant in Tennessee, the Hanford plant in Washington, and the Mound plant in Ohio. In 1990, the community around the Fernald plant in Ohio received \$78 million from the government.

Many Jurisdictions Are Officially Opposed to Nuclear Waste Transportation through Their Communities!

These include Los Angeles, Ventura, Santa Barbara and San Luis Obispo Counties, and the city of Santa Barbara, CA; Denver, CO, St. Louis, MO; Philadelphia, Bucks County, and Falls Township, PA; Mt. Rainier, Takoma Park and Greenbelt, MD; Marshall and Anson Counties and the town of Wadesboro, NC; Decatur, GA; Amherst, MA, Beacon, NY and more.

Sante Fe vs. Komis—The Court Awards Property Damages

In 1992, the New Mexico Supreme Court upheld a jury decision to award John and LEMONIA KOMIS \$337,815 in damages for perceived loss due to public perception of fear. The Komis property was located along a Waste Isolation Pilot Project (WIPP) nuclear waste transportation route, and the case proved that property values do indeed decline because people are afraid of the dangers associated with nuclear waste transportation.

In the case decision, the court referenced a public opinion survey conducted by Zia Research Associates, Inc., which showed that 71% of the respondents believed that residential property value would decrease because of its location near a WIPP route.

The Court also stated in its decision that "Whether the transportation of hazardous nuclear materials actually is or is not safe is irrelevant; the issue is whether public perception of those dangers has a depressing effect on the value of the property not taken." In other words, your property value may decrease simply because people are afraid of the possible consequences of nuclear waste transportation!

Get your local government to pass a resolution Opposing Nuclear Waste Transportation through your community?

WHEREAS, according to documentation provided by the State of Nevada which indicates that radioactive waste may be transported through [this jurisdiction] as early as 2006 should Senate Bill 1287 or similar legislation be enacted by the U.S. Congress;

and WHEREAS, [this jurisdiction] does not have adequately trained emergency response personnel or equipment to cope with a radiological disaster that could occur as a result of radioactive waste transportation through [this jurisdiction];

and WHEREAS, the federal government, under the bills listed above, would limit funding to [this jurisdiction] for training of emergency response personnel and for purchase of necessary equipment to cope with a radiological emergency;

and WHEREAS, property values are likely to fall, attraction of new business is likely to fall, and improvement of the communities [our community] may become difficult if not impossible should radioactive waste be transported through [this jurisdiction];

and WHEREAS, this radioactive waste is to be transported to an "interim" site in Nevada, and thus does little or nothing to solve our nation's radioactive waste problem;

and WHEREAS, we generally oppose radioactive waste transportation through [this jurisdiction];

BE IT RESOLVED, that [this jurisdiction] is on record as opposing any and all legislation which would require radioactive waste transportation near or through [this jurisdiction];

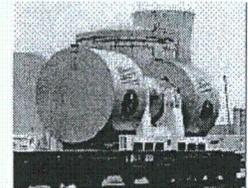
and BE IT RESOLVED, that [this jurisdiction] supports creation of an independent presidential commission to re-examine our nation's radioactive waste policy;

and BE IT RESOLVED, that [this jurisdiction] will carry this resolution to all of our elected local, state, and federal officials, and to the President of the United States.

Shipments Will Be Frequent and Will Occur for Many Years

Depending on where you live, as many as 3-5 shipments per week could roll past your home for 25 years. Because most of the nuclear waste is located in the East and Yucca Mountain is in the West, many communities will be exposed to large amounts and frequent shipments of nuclear waste throughout the entire shipping campaign.

The Department of Energy reports that the region of impact for public health and safety along transportation routes is 800 meters (.5 mile) on either side of the center line of transportation rights-of-way for non-accident conditions, and 80 kilometers (50 miles) for accident conditions.



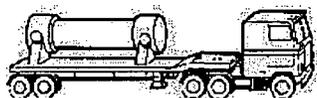
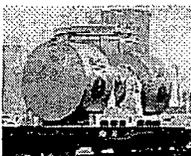
Insurance Does Not Cover Radiological Incidents

Neither homeowners insurance nor health insurance covers problems caused by radiological accidents. Check your policy! It will explicitly state that you will not be covered if your damage or illness is caused by a nuclear accident.

What does a radioactive waste transportation cask look like?

The casks that would be used to transport high-level nuclear waste look like large concrete dumbbells. The nuclear waste would be housed in the middle section, and the end sections are called "impact limiters." These casks have never been properly tested, and the consequences of an accident could be severe.

The DOE's own estimates suggest that at least 50 accidents could occur during shipment of radioactive waste. As part of the 1986 Environmental Assessment for the Yucca Mountain repository site, the DOE conducted a study that found that a severe accident in a rural setting involving a high-speed impact, lengthy fire and fuel



oxidation would contaminate a 42-square-mile area, require 462 days to clean up and cost \$620 million. The health, economic and environmental impacts of such an accident could devastate a community. If such an accident occurred in an urban area, the costs and other consequences would be much more severe.

Will the value of my property be affected by the Government's plan to transport nuclear waste to Yucca Mountain?

Experience has shown that property values decline significantly along nuclear waste routes. In 1992, the New Mexico Supreme Court upheld a jury decision to award John and Leonia Komis \$337,815 in damages for perceived loss due to public perception of fear. The Komis property was located along a Waste Isolation Pilot Project (WIPP) nuclear waste trans-

portation route, and the case proved that property values do indeed decline because people are afraid of the dangers associated with nuclear waste transportation.

Most states require that potential property buyers be informed if the property for sale is located on a potential nuclear waste transportation route. This means that even if nuclear waste isn't already traveling past your home, your property value may decrease, and your property may become difficult to sell. Residents should not be "stuck" with property that they cannot sell along a nuclear waste transportation route.

Are the casks safe?

Nuclear waste transportation casks have never been fully physically tested. The Nuclear Regulatory Commission sponsored a study in 1987 completed by the Lawrence Livermore National Laboratories. This study, commonly referred to as the "Modal Study," used computer modeling only to predict cask responses to accident conditions. The study was inadequate because it did not use real life, full-scale testing of the casks. Further, the test criteria were developed in the 1960's and have not changed since, despite changes in traffic volume, travel speeds, and hazardous cargoes on our roads and rails.

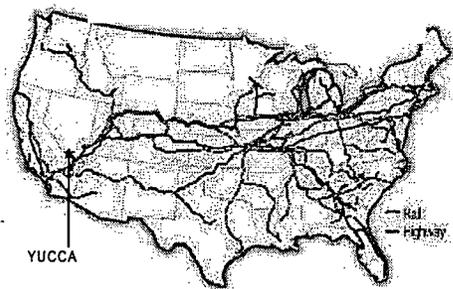
Even the Nuclear Regulatory Commission realizes that these tests were inadequate, and has contracted with Sandia National Labs to conduct a new study, called "Modal II," or the "Package Performance Study." Although this study is very much needed, it will not be completed until 2003—long after the Department of Energy applies for a license to construct and operate a nuclear waste repository at Yucca Mountain.

All tests to date have been computer simulated and have NOT been fully physical tests.



Will Radioactive Waste Travel Through My State?

The nuclear power industry has created thousands of tons of deadly nuclear waste, and it could soon be traveling through your community! Along with its allies in the federal government, the nuclear industry is pushing Congress to establish a nuclear waste dump at Yucca Mountain, Nevada. If they are successful, 100,000 shipments of high-level radioactive waste, now located at 77 sites across the country, will be transported through 43 states. Fifty million Americans will be put at risk over 25 years, as waste moves past homes, workplaces, recreational areas, schools, and hospitals. The map below shows the routes that would most likely be used to transport the waste.



Where is Yucca Mountain?

Yucca Mountain is located in Nevada, about an hour northwest of Las Vegas. Located in a desert landscape, its public lands include part of the Nevada Test Site and Nellis Air Force Base. However, the entire area is part of the Western Shoshone people's traditional homelands, as recognized by the U.S. government when it signed the Treaty of Ruby Valley in 1863. If a dump is built at Yucca Mountain, the Shoshone will lose access to a place they consider sacred.

What Can I Do?

- ✎ **Write to your Members of Congress** and tell them that you do not want high level nuclear waste to travel through your community. You can use the sample post card text below, or write one in your own words, telling your Representative and Senators your concerns. Send your note on a post card depicting a local scene if you can to drive home the point that you're a voter in their next election.
- ✎ **Host a letter-writing party** and have your friends and family write letters or postcards, too. Remember, the more calls, post cards, letters, and faxes your Members of Congress receive, the more likely they are to take your concerns seriously.
- ✎ Also, if you belong to a group yourself, **put an article in the newsletter**, make an announcement at a meeting, or arrange to have a speaker address your group on this issue.
- ✎ If you are a teacher, **have your students make posters** or design their own postcards to send to your Representative and Senators..
- ✎ Contact us (see back of flyer) for more flyers or other materials, or to arrange a presentation to your group.

Dear Rep./Senator _____

I do not want high level nuclear waste travelling through my hometown!

The risks of nuclear waste transportation are high, and I am worried that my local emergency responders are not prepared to deal with a nuclear waste accident and that my property value will decline if I live on a transportation route.

Please **OPPOSE** any legislation that would put nuclear waste on our roads and rails.

Sincerely,
Your Name and Complete Address

Representative X
House of Representatives
Washington, DC 20515

OR

Senator Y
U.S. Senate
Washington, DC 20510



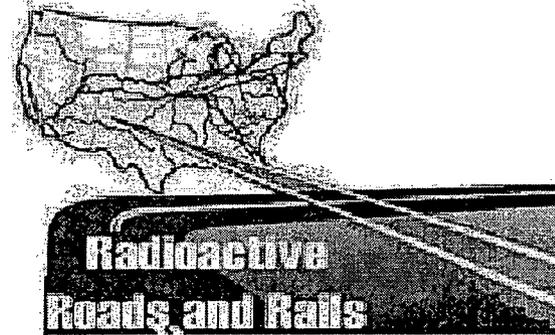


For more information, contact:

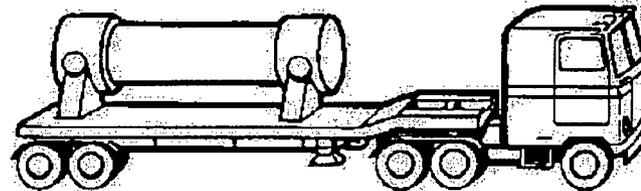
Public Citizen's Critical Mass
Energy and Environment Program
215 Pennsylvania Avenue, SE
Washington, DC 20003
www.citizen.org/cmep
202-546-4996
202-547-7392 (fax)

OR

Nuclear Information
Resource Service
1424 16th Street, NW, #404
Washington, DC 20036
www.nirs.org
202-328-0002
202-468-2183 (fax)



**Get the Facts on
Nuclear Waste
Transportation!**



What is the Time Frame for the Decision about the Dump and the Transportation of Waste?

The Department of Energy (DOE) is now in a "site characterization" phase, which means that it is performing tests at the Yucca Mountain site to determine its suitability as a site for the disposal of radioactive waste. If the DOE determines that the site is acceptable, it will apply in 2001 for a license from the Nuclear Regulatory Commission (NRC). If the license is granted, construction will begin in 2006. If all goes according to the DOE's plan, waste will be accepted at Yucca Mountain beginning in 2010 and will continue to arrive at Yucca Mountain for 24 years, with the final "emplacement" activities ending in 2035.

Where can I get more information?

If you have access to the World Wide Web, check out these sites:

Public Citizen's Critical Mass Energy and Environment Program

<http://www.citizen.org/cmep>

Nuclear Information Resource Service

<http://www.nirs.org>

Shundahai Network

<http://www.shundahai.org>

Citizen Alert

<http://www.igc.org/citizenalert/>

State of Nevada Nuclear Waste Project Office

<http://www.state.nv.us/nucwaste/index.htm>

Yucca Mountain Project Office (DOE)

<http://www.ymp.gov>

Nuclear Regulatory Commission

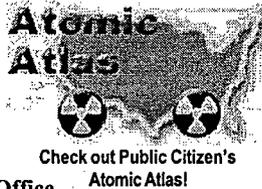
<http://www.nrc.gov>

EPA Yucca Mountain Homepage

<http://www.epa.gov/radiation/yucca/>

NRC/Sandia Labs Modal Study Page

<http://ttd.sandia.gov/nrc/modal.htm>



How much waste will go to Yucca Mountain?

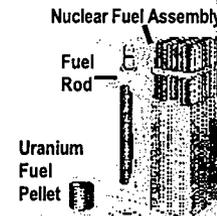
Under current law, 70,000 metric tons of waste (one metric ton is about 1.1 tons or 2200 pounds) would be allowed to be stored at Yucca Mountain, with 63,000 tons of that being commercial waste and the rest being DOE waste. However, that still would not accommodate all the waste projected to be produced by the time the repository opens (an estimated 107,500 metric tons of both commercial and DOE waste). This means that legislators would either have to change the law to allow more waste to go to Yucca Mountain, or open a second repository in another state (because they are unwilling to look at other solutions to the nuclear waste problem).

What is High-Level Radioactive Waste?

High-level radioactive waste is produced at commercial nuclear power plants and nuclear weapons production facilities. Nuclear fuel is made of pellets of enriched uranium, sealed in fuel rods, which are bundled together into nuclear fuel assembly. The fuel assembly powers the nuclear reactor until it is no longer efficient in generating electricity. The "spent" fuel is replaced about once a year. Spent fuel—which is highly radioactive—is the primary form of high-level nuclear waste.

Spent fuel is both thermally and radioactively hot, so irradiated fuel assemblies are placed in "spent fuel pools" to cool and allow some of the radioactivity to decay. Each reactor has only a certain amount of pool space, and when the pools are full, the reactors either must shut down or store some of the cooled spent fuel somewhere else.

A person standing one yard away from an unshielded, 10 year old fuel assembly, would receive a lethal dose of radiation (500 rem) in less than three minutes. A thirty-second exposure (100 rem) at the same distance, would significantly increase the risk of cancer or genetic damage.



REPROCESSING RADIOACTIVE WASTE

EXPENSIVE FOR TAXPAYERS / RATEPAYERS

EXTREMELY POLLUTING AND RISKY

INCREASES VOLUME OF RADIOACTIVE WASTES

To Call It Recycling Is Misleading!

Reprocessing Generates Much Larger Waste Streams.

DOE Estimates:

3 to 11 Times More Low-Level Radioactive Waste

163 Times More "Greater than Class C Waste"

Internationally, Reprocessing Has Been An Abysmal Failure

- ✓ France dumps 100 million gallons of radioactive waste into the English Channel every year.
- ✓ The United Kingdom has released over 1,000 pounds of plutonium into the Irish Sea.
- ✓ More than \$20 billion has been spent on the Japanese reprocessing plant, which failed to start after more than two years of attempts;

Dangers and Costs of Reprocessing Nuclear Waste

Reprocessing is not the solution to the nuclear waste problem. It has already been a very expensive boondoggle.

- ✓ Reprocessing is extremely expensive
- ✓ Extremely Polluting
- ✓ It would be a dangerous shift in U.S. global nonproliferation policy.

Reprocessing is the most polluting part of the nuclear fuel cycle.

Reprocessing would dramatically increase the threat from and complexity of dealing with nuclear waste from power plants. Rather than solving our nation's nuclear waste problem, it actually makes more waste.

Reprocessing is NOT fiscally sound.

Lifecycle cost analysis for the program shows it is astronomically expensive. It appears no reprocessing program in the world has been commercially successful. Such a program in the United States would likely be paid for in full by U.S. taxpayers.

- According to a 1996 estimate by the National Academy of Sciences, reprocessing will "easily" cost taxpayers \$100 billion.
 - ✓ This estimate is only for existing U.S. irradiated fuel.
 - ✓ It does not include waste produced as a result of 20-year license extensions, waste from new domestic reactors, or the importation of foreign waste to the United States for reprocessing.
- U.S. taxpayers are still paying several billion dollars each year to clean up contamination from reprocessing programs in the 1960s and 1970s for nuclear weapons at the following locations:
 - ✓ Hanford Site (WA)
 - ✓ Savannah River Site (SC) And for reprocessing of naval irradiated fuel at the
 - ✓ Idaho National Laboratory (ID)
 - ✓ Commercial reprocessing at West Valley (NY).
- The only commercial reprocessing site ever to operate in the U.S. is in West Valley, New York.
 - ✓ Projected clean-up costs for this site alone is more than \$5 Billion
 - ✓ Only a fraction of the nuclear waste was sent there between 1966 and 1972.
- Reprocessing was abandoned in the US for over 30 years.
 - ✓ France, Britain, and Russia are reaping hideous environmental legacies of contamination and disease from reprocessing.
 - ✓ Every processing site is a catastrophe, with massive releases of radioactivity to air, land, and water, high worker radiation exposures, and residues harder to handle than original wastes.
- Reprocessing is also a threat to U.S. nonproliferation efforts.
 - ✓ It would increase the likelihood that a terrorist could obtain fissile material to build a nuclear bomb
 - ✓ Materials, technical personnel, technologies and specialized equipment involved in these processes could leak out, as they have in the past, to foreign clandestine weapons programs or be diverted within a state's program to make nuclear weapons.
- Reprocessing would NOT eliminate the need for a geologic repository – It's NOT RECYCLING
 - ✓ Reprocessing actually increases waste volume and destabilizes nuclear wastes
 - ✓ It doesn't reduce radioactivity – it actually spreads radioactive contamination.
 - ✓ It would actually increase the number of radioactive waste streams to be managed.

DOE officials testified to Congress that they do not know whether the full complement of necessary technologies, including reprocessing, fast reactors, and fuel fabrication, would ever work or be economically competitive.

- Massive funding would be needed for:
 - ✓ Siting facilities
 - ✓ Completing Environmental Impact Statements
 - ✓ Soliciting commercial vendors
 - ✓ Ordering equipment for reprocessing, fast reactor, and fuel fabrication plants
- Reprocessing in France

France reprocesses spent nuclear fuel by soaking it in acid to extract plutonium and slightly enriched uranium.

 - ✓ This results in massive releases of radioactive gases and liquids that place people and the environment at great risk.
- Much of the so-called low-level – but highly radioactive wastes generated by reprocessing are discharged into the sea and air from LaHague on the Normandy Coast.
 - ✓ Discharges have been measured 17 Million Times more radioactive than normal sea water.
 - ✓ Liquid discharges have resulted in contamination of area beaches and seen as far away as the Arctic Circle.
 - ✓ They may have contributed to elevated leukemia rates near La Hague.
- La Hague routinely releases radioactive gases into the air.
 - ✓ Krypton-85 at levels thousands of times higher than natural radiation levels.
 - ✓ Carbon-14 that is the most damaging to human health.

Low-Level Radioactive Wastes

Low-Level Does Not Mean Safe.

"So-called" low-level radioactive wastes can take as long as 500 years to fade to natural background levels.

Low-level Radioactive Wastes Are Piling Up Everywhere. The attached news article shows we are running out of room to store low-level radioactive wastes. Until July 2008 there were 3 sites in the nation that would accept Limerick's low-level radioactive wastes located in South Carolina, Utah, and Washington State. July 2008, South Carolina, the closest site closed.

As long as Limerick continues to operate massive amounts of low-level radioactive wastes will continue to be produced. Limerick's Low-Level Radioactive Wastes Include:

- ✓ Waste Sludges
- ✓ Filter Elements
- ✓ Contaminated Equipment
- ✓ Paper
- ✓ Rags
- ✓ Plastic Sheeting
- ✓ Spent Demineralizer Resins
- ✓ Evaporator Bottoms
- ✓ Materials Used In Decontamination and Contamination Control

These wastes include:

- ✓ Shoe Coverings
- ✓ Gloves
- ✓ Mops
- ✓ Wiping Rags
- ✓ Tools
- ✓ Water Treatment Residues
- ✓ Spent Resins
- ✓ Evaporated Bottoms
- ✓ Waste Sludges
- ✓ Filter Elements
- ✓ Plastic Sheeting
- ✓ Machine Parts

ACE asked NRC and DEP for an accounting of the destination of all Limerick's massive low-level radioactive wastes since 2000 when Exelon bought Limerick Nuclear Plant. To this day, we never received an accounting.

- There was no direct answer to that question.
- There was some confusion about where Limerick's low-level wastes will be stored until 2029.
- December 2009, DEP claimed they were stored in buildings on site in Limerick.
- One month later, a Mercury news article said Exelon was trying to send Limerick's wastes to another Exelon site in PA, Peach Bottom.
- **Can Peach Bottom store all Limerick's waste and their own until 2029? Until 2049?**

When Limerick Nuclear Power Plant applied for its Title V major air pollution license renewal, we questioned whether Limerick was incinerating low-level radioactive wastes. Due to our past investigations and opposition to incinerators in our community, we recognized that some of the air pollutants listed in Limerick's air pollution permit were the same as those from an incinerator. Burning does not make radiation disappear. Inhaling radionuclides is one of the worst route of exposure.

Section D Source Level Requirements #005 – Operating permit terms and conditions

(a) "The permittee, may, in auxiliary boiler "A", fire ... Specific Waste Derived Liquid Fuel (WDLF)."

The air toxics listed below from the WDLF are similar to those from incineration. The permit stated that WDLF Shall Meet Following Contaminant Limits Prior to mixing and Shall Not Exceed Limits After mixing:

(PRIOR to mixing with virgin No. 2 oil)		(AFTER mixing or out the stack?)	
• Arsenic	10 ppm	Arsenic	5 ppm
• Cadmium	10 ppm	Cadmium	2 ppm
• Chromium	20 ppm	Chromium	10 ppm
• Lead	300 ppm	Lead	100 ppm
• PCB	49 ppm	PCB	10 ppm
• Total Halogens	1000 ppm	Total Halogens	1000 ppm
		Ash	2% ASTMD-482
		Sulfur	0.3% X-Ray Diffraction

Permit States: Maximum Amount of WDLF to be burned in the boiler shall not exceed;

- 1) 10,000 gallons over 12 consecutive months
- 2) Maximum of 3,000 gallons in any single month

The list above suggested to us that Exelon was incinerating at least some of Limerick's LLRW in one of Limerick's 3 boilers, calling it "Waste Derived Liquid Fuel". Our major concern was the synergistic, additive, and cumulative harmful health impacts from all these toxics, combining with all the different kinds of radionuclides routinely released at Limerick, plus the magnified radiation risks from burning LLRW. Experts helped explain the extreme danger with the potential consequences of exposure to radionuclides from an incineration process.

PA DEP's response document denied that Limerick was burning low-level radioactive waste, but also failed to answer many of our specific questions.

Most interesting - we asked for an accounting of all low-level radioactive waste amounts and their destinations since 2000, to compare the amounts before and after the closing of Pottstown Landfill in 2005 and Barnwell, S.C.

- Ironically, PA DEP's response document 12/09 claimed all Limerick's low-level rad-wastes were stored in a special building on-site. A month later an article in our local paper said Exelon was requesting permission to send Limerick's low-level radioactive waste to another Exelon site in PA, Peach Bottom.

How many years will Peach Bottom be able to continue to store massive amounts of Limerick Nuclear Plant's low-level radioactive wastes?

If it can't go to Peach Bottom, where will that waste be stored until 2029 when Limerick closes?

If NRC would relicense Limerick until 2049, there needs to be a verified answer to where all Limerick's low-level waste will be stored until 2049.

- **INCINERATING LIMERICK'S LOW-LEVEL RADIOACTIVE WASTE IS NOT AN OPTION IN THIS HEAVILY POPULATED REGION WHERE THERE IS ALREADY A HEALTH CRISIS.**

Is Limerick Nuclear Plant

BURNING

(INCINERATING)

Low-Level Radioactive Wastes

In A Boiler As Waste Fuel?

➤ **Instead Of Paying To Transport
Massive Amounts Of Its Low-Level
Radioactive Wastes Across the Nation?**

- **Air Pollutants Listed From Limerick's Boiler A
Are Also Emitted From Incinerators**
- **Burning Waste In A Boiler Is A Form Of Incineration,
Without Even Minimal Incineration Requirements**
- **Incinerating Low-Level Radioactive Wastes Would Add
Dramatically To Health Risks In Our Entire Region**
- **Where Is All Limerick's Low-Level Radioactive Waste Going
Now Since Barnwell, S.C. closed in July, 2007?**

Radioactive Wastes

12/08 ACE asked DEP to provide yearly totals for the massive amounts of Limerick Nuclear Plant's radioactive wastes and how much was transported off-site, before and after closing of Pottstown Landfill and Barnwell, S.C.

- **DEP's Comment Response Document failed to provide the information we requested 12/08 about radioactive waste disposal totals transported off-site. We still don't know how much radioactive waste Limerick transported off-site each year before and after closing of Barnwell, S.C. and Pottstown Landfill.**
- **DEP provided information on radioactive wastes that we did not request, but which left us with additional questions about Limerick's radioactive wastes.**

For Example on Pg. 4

The response document says Class B and C radioactive wastes are not transported off-site.

- DEP says **low-level radioactive wastes** (filters, resins, tools, equipment, protective gloves, clothing, and respiratory equipment are **stored on-site in high integrity concrete vaults in the rad-waste building and not transported off-site.**

DEP's list above shows that the routine radioactive waste stream is enormous.

- 1. Yet, Class B and C are not transported off-site**
- 2. But instead are stored on site in the rad-waste building.**

Questions Triggered by DEP Responses:

- a. How large are the high integrity concrete vaults that store routine radioactive wastes listed above?
- b. How many are there?
- c. How much Class B and Class C radioactive waste can the rad-waste building continue to hold, year after year?
- d. Won't it eventually run out of space?
- e. Then where will they go?
- f. Will other high-integrity concrete vaults be built in our back yard on Limerick's site?

DEP says Class A radioactive wastes are stored on-site until short-lived radionuclides decay to safer levels and there is enough to transport it to the US NRC licensed disposal site near Clive, Utah.

- a. Where is this radioactive waste stored until it decays to safer levels for transport to Utah?
- b. Are there specific standards for 'safer levels' of transport for each radionuclide?
✓ If not, why not? If so, please provide acceptable 'safer' levels for each radionuclide and for their decay radionuclides before wastes can be transported.
- c. Does DEP require testing for the radioactive decay products in the soil, water, food?
- d. How much radioactive waste is considered enough to transport?
- e. How is it transported?
- f. Are the trucks or trains decontaminated after the trip? Who pays for that?
- g. Are those who transport the waste given proper protective gear?

News

Limerick can send some nuclear waste to Lancaster plant

Published: Sunday, June 05, 2011; Last Updated: Sun. Jun 5, 2011, 12:05pm

By Evan Brandt ebrandt@pottsmmerc.com

LIMERICK — Low-level radioactive waste from Exelon Nuclear's Limerick Generating Station can now be transferred to a Lancaster-area nuclear power plant as the result of a recent decision by the Nuclear Regulatory Commission.

The request was made in early 2010 when Exelon realized it does not have enough appropriate storage space at its Limerick plant. NRC approved the request to begin sending it to Peach Bottom Atomic Generation Station on May 31.

Prior to the Jan. 6, 2010, request from Exelon, the plant had sent this type of waste to a disposal facility in Barnwell, South Carolina.

But that facility closed its doors in 2008 to all low-level radioactive waste except that generated in plants that are part of the Atlantic Low-Level Waste Compact. Pennsylvania is not a part of that pact.

Low-level radioactive waste is not the spent fuel rods that are kept in pools and, once they've cooled sufficiently, are stored in steel and concrete casks on the Limerick property.

Rather, low-level radioactive waste can be things like tools, lab coats, shoe covers even paper towels, that have become irradiated and cannot be disposed of in the regular trash stream.

"Most LLW (about 95 percent) is Class A, the lowest concentration category," NRC spokesman Neil Sheehan wrote in a recent email to The Mercury.

"Remaining radioactive wastes are either Class B or Class C, depending on their radioactivity. (Concentration is the total amount of radioactivity divided by the weight or volume of the waste.)

"Class A waste consists of such materials as trash, discarded clothing, oils and sludges.

"Class B waste is largely composed of equipment and materials from nuclear power plants and includes such items as used hardware (tools), filters and water purification resins. Continued...

"Class C, which represents less than 1 percent of all low-level radioactive waste, includes irradiated reactor parts. Waste in this category has higher concentrations of radioactivity and requires engineered barriers designed to prevent against inadvertent intrusion for at least 500 years," Sheehan explained.

The NRC studied the risks of transporting this waste and found them no worse than the risk of transporting them to South Carolina.

Shipments of the waste occur only two or three times a year and can be accommodated at Peach Bottom because that plant has more extensive storage facilities.

Even though the waste will be stored at Peach Bottom, "Limerick will retain decommissioning responsibility for any low-level radioactive waste transferred" there, Sheehan said.

Further, "all transferred low-level radioactive waste sent to Peach Bottom must ultimately be transferred to a disposal facility."

However, Sheehan confirmed that for states not part of the compact with access to Barnwell, "there is not currently any disposal facility for Class B & C low-level radioactive waste."

Limerick power plant may send waste elsewhere

Published: Monday, February 1, 2010 By Evan Brandt, ebrandt@pottsmmerc.com

LIMERICK — Exelon Corp. has applied for government permission to begin shipping some of the low-level radioactive waste generated at the Limerick Nuclear Generating Station to its Peach Bottom Atomic Power Station in York County.

The request to modify the license at Peach Bottom was filed with the U.S. Nuclear Regulatory Commission on Jan. 6.

The waste in question is not the highly radioactive spent fuel rods which Limerick has been storing on-site since it first opened in 1986. The second unit opened in 1990.

The waste is classified by the NRC as "Low-Level Radioactive Waste" and is generally things like shoe coverings, mops, wiping rags, filters, tools and reactor water treatment residues that have become contaminated by contact with radioactive material or become radioactive themselves through exposure to neutron radiation, said NRC spokesman Neil Sheehan.

The NRC further classifies this waste as being of A, B or C grade. Grade A emits the lowest level of radiation, with the other two classes emitting higher levels.

All nuclear plants have facilities to store this waste and Limerick is no different, said Joseph Szafran, a spokesman for the Limerick plant, located off Sanatoga Road.

In fact, Limerick has the capacity to store its grade B and C radioactive waste on-site until 2012 and beyond, Szafran said. But that may not be long enough.

Driving Exelon's request is a nationwide shortage of facilities that accept radioactive waste.

On July 1, 2008, the nearest such facility, located in Barnwell, S.C. and owned by Energy Solutions, was ordered by South Carolina to close its gates to radioactive waste from any state not part of Atlantic Interstate Low-level Radioactive Waste Management Compact Commission, which is comprised of South Carolina, Connecticut and New Jersey.

The only other similar facility in the nation is in Richland, Washington State, which serves 11 states on the west coast and in the Rockies and restricted its waste to those in its two compact, Sheehan said.

Another facility may be built in Texas, but currently low level nuclear waste from 36 states has no final resting place.

Sheehan said Exelon's application to ship Limerick's waste to Peach Bottom is the first in NRC Region One, which oversees nuclear operations in the northeast and mid-Atlantic states from Maryland to Maine, but it may not be the last.

"This is not a new issue," Sheehan said. "For a while Barnwell was willing to accept waste from states not in the Atlantic Compact and in the meantime, there was an effort to find towns willing to host a facility, but there weren't any volunteers."

With Barnwell closing its doors to all but members of its compact, plants throughout the 36 states not part of any compact will soon begin grappling with the issue of class B and C waste.

Less of a concern is the class A waste, which is accepted at another Energy Solutions facility, this one in Clive, Utah.

Exelon, which operates 17 nuclear reactors around the country, is among those companies that must find a place to dispose of, or store, its more radioactive waste.

The Jan. 6 application suggests one solution it is now exploring is to consolidate some of it at one plant.

Peach Bottom began commercial operation in 1974, much earlier than Limerick and, in apparent anticipation of having to store its waste on-site, built a large facility to do that, Szafran said.

Although the Peach Bottom storage was designed mostly for class A waste, because that waste is now shipped to Utah, it has room for class B and C waste, both its own and Limerick's, Exelon contends.

It can store the waste from both plants for as long as 44 years, Szafran said.

He also noted that Exelon has made great efforts to reduce the amount of radioactive waste it generates, in part due to the difficulty of disposing of it. If the volumes can be further reduced, the lifespan of Peach Bottom's storage facility may be extended even further, Szafran said.

Waste reduction is not restricted to Exelon, Sheehan said. All nuclear plant operators face the same dilemma and all have made strides toward reducing their waste.

"There is a much greater degree of planning that goes into every activity in order to reduce the things that get contaminated," Sheehan said.

The license application notes that Exelon examined the possibility of building a similar waste storage facility at its Limerick facility, but concluded it would be more cost-effective to ship it to Peach Bottom, located about 50 miles southeast of Harrisburg.

Szafran said the cost to build a similar facility in Limerick would be "in the millions of dollars," but said if the NRC denies Exelon's request to send it to Peach Bottom, the company may have no other choice.

Exelon's third-quarter income rose by 8 percent to \$757 million, but dropped 18 percent in the fourth quarter, earning only \$581 million, according to the Associated Press. In 2009, it cut expenses by \$22 million and cut 500 jobs.

Exelon's application argues that since Limerick's low-level waste previously had to be transported 710 miles to Barnwell, taking it only 80 miles to Peach Bottom "thus poses less of a risk to the public."

Szafran was asked if, following Exelon's own logic, keeping Limerick's waste in Limerick doesn't pose the least risk of all to the public.

He would say only that low-level radioactive waste materials such as this are shipped all over the country and that the safety record, particularly given the resilience of the HDPE plastic containers in which the waste is stored, makes shipping it to Peach Bottom "not an issue."

The facility at Peach Bottom will not need to be re-built or altered in order to hold the more radioactive waste, Sheehan said. The license application said the placement of more radioactive waste in the center of the facility reduces the radiation exposure to acceptable levels outside.

The Peach Bottom site can hold 520 containers in 35 separate cells, according to the application. Each cell has 14-

inch thick concrete walls and a 24-inch concrete cap. The entire facility also has "36-inch concrete shield walls on the peripheral wall."

The application estimates that the radiation dose at "the nearest restricted boundary" when the facility is "filled to capacity" would be less than the limits specified by the NRC.

The application estimated the off-site radiation dosage from the facility would be one millirem per year. The NRC limit is 25 millirems per year.

Sheehan said the human body is generally exposed to 360 millirems every year "from natural and man-made causes."

By way of comparison, he said a chest X-ray is eight millirems; a mammogram is 138 millirems and watching four hours of television exposes the watcher to 4 millirems. The human body itself produces 40 millirems of radioactivity, he said.

Last April, Exelon applied to the NRC to extend Limerick's operating license to 2024 and 2029 for units one and two respectively. Szafran said Peach Bottom's license extension has already been granted by the NRC.

Sheehan estimated it would take about one year for the NRC's central office in Rockville, Md. to review the Jan. 6 application and make a decision, "although it could take long longer as this is a bit unusual."

If it is found to be acceptable, the NRC will publish a notice in the Federal Register and anyone who wants to initiate a public hearing on the proposal will have 60 days to identify legitimate concerns.

The situation with the low-level radioactive waste is analogous to the situation with the highly radioactive spent fuel rods.

The federal government had pledged to build a facility for the spent fuel and, until recently, had focused its long-delayed and over-budgeted efforts on Yucca Mountain, Nevada, home state of Senate Majority Leader Harry Reid, a Democrat.

Almost a year ago, shortly after taking office, the Obama administration announced it would cease studying Yucca Mountain, which had been found to be less geologically and hydrodynamically ideal than was first thought.

In 2007, Exelon broke ground on a storage facility for its spent fuel rods, the pool in which they had been kept since the plant opened being near to full. The older rod assemblies are rotated out of the pool and into a steel "dry cask," which is stored inside a concrete bunker. The newer, hotter fuel, is then placed in the pool inside the reactor building.

The spent fuel remains radioactive for hundreds of years.

On Friday, the U.S. Energy Secretary Steven Chu announced the formation of a "Blue Ribbon Commission on America's Nuclear Future to develop a "safe, long-term solution to managing the Nation's used nuclear fuel and nuclear waste."

Two days earlier, President Barack Obama issued a call for more nuclear power plants in his State of the Union address. He made no mention of where the additional waste will be put.

To date, 55 years since the first atomic power plant was started up and 33 years since President Jimmy Carter banned the re-processing of nuclear fuel to halt the proliferation of nuclear weapons, a final solution for what to do with nuclear waste has yet to present itself.

The Patriot-News

Disposal of nuclear waste nears crisis stage

Nation running out of room for material

June 09, 2008 BY GARRY LENTON

HOT TRASH

Low-level radioactive waste (from nuclear plants, medical labs, and hospitals) typically consists of:

- ✓ Contaminated protective shoe covers and clothing
- ✓ rags
- ✓ mops
- ✓ filters
- ✓ reactor water treatment residue
- ✓ equipment and tools
- ✓ luminous dials
- ✓ medical tubes
- ✓ swabs
- ✓ injection needles
- ✓ syringes
- ✓ laboratory animal carcasses and tissues.

The radioactivity can range from just above background levels found in nature to highly radioactive in certain cases such as parts from inside the reactor vessel in a nuclear power plant. Source: Nuclear Regulatory Commission

Technetium-99m - Doctors rely on it to diagnose conditions such as heart disease and bone cancer. "It's injected for a picture, then gone in a day or two."

But making nuclear medicines creates radioactive trash that must be shipped to one of three specially licensed facilities for storage.

July 1, one of those three, the Energy Solutions landfill in Barnwell, S.C., closed its doors.

For Pennsylvania and 35 other states, it's the only place to send some forms of low-level radioactive waste.

While alternative temporary storage might be available, experts say a bigger issue is finding a long-term solution for the waste.

"This will be a national crisis," said Dave Allard, director of Pennsylvania's Radiation Control Program. "Many states will not have adequate storage." **Pennsylvania, one of the largest producers of low-level radioactive waste** may have space to store the trash for up to 20 years.

In Pennsylvania, the closure will affect businesses that use radioactive materials and generate contaminated trash. Sources include nuclear plants. The **nuclear industry produces about 42 % of volume of low-level radioactive waste shipped to disposal sites**, according to the Electric Power Research Institute.

Clive, Utah accepts only the lowest level of contamination. **Waste with higher radioactivity will have to be stored where it is made.** The industry's Nuclear Energy Institute hopes a permanent solution will be in place in 50 years.

Without access to permanent storage, some users will have to build space for temporary storage. Such areas must meet federal regulatory standards for safety and security, said Neil Sheehan, a spokesman for the U.S. Nuclear Regulatory Commission.

In 1980, Congress made the states responsible for low-level radioactive waste.

- Pennsylvania joined with West Virginia, Maryland and Delaware and spent years and millions of dollars designing an above-grade storage system.
- Strong public opposition caused Gov. Ridge to pull the plug on the process in 1998.

Will that process be revived?

Not likely, said Rich Janati, the chief of the division of nuclear safety at the state Department of Environmental Protection's Bureau of Radiation Protection. "Economically, it wouldn't make sense to revive that project," Janati, DEP's Rad Protection Department said.

State and industry officials anticipate the private sector will fill the void, but that's not a certainty.

- ✓ Waste Control Specialists in Texas is seeking permission to accept higher-level radioactive waste at its facility

Powerful images inspiring public opposition to radioactive waste storage in their state;

- ✓ Hiroshima
- ✓ Nagasaki
- ✓ TMI
- ✓ Chernobyl

Eric Epstein, Three Mile Island Alert, said radioactive waste has been ignored by lawmakers for too long. **If nothing is done, future generations will be stuck with solving the disposal problem, just as Pennsylvanians today are stuck with cleaning up abandoned coal mines,** he said.

"I think people need to understand that there is no radioactive tooth fairy who is gong to appear and take care of this issue," he said.

National / International

Nuclear waste, worries piling up

Landfill restrictions in S.C. took away an option for disposal of radioactive material. Experts are concerned.

By Seanna Adcox
ASSOCIATED PRESS

BARNWELL, S.C. — Tubes, capsules and pellets of used radioactive material are piling up in the basements and locked closets of hospitals and research installations around the country, stoking fears they could get lost or, worse, stolen by terrorists and turned into dirty bombs.

For years, truckloads of low-level nuclear waste from most of the United States were taken to a rural South Carolina landfill. There, items such as the rice-size radioactive seeds for treating cancer and pencil-thin nuclear tubes used in industrial gauges were sealed in concrete and buried.

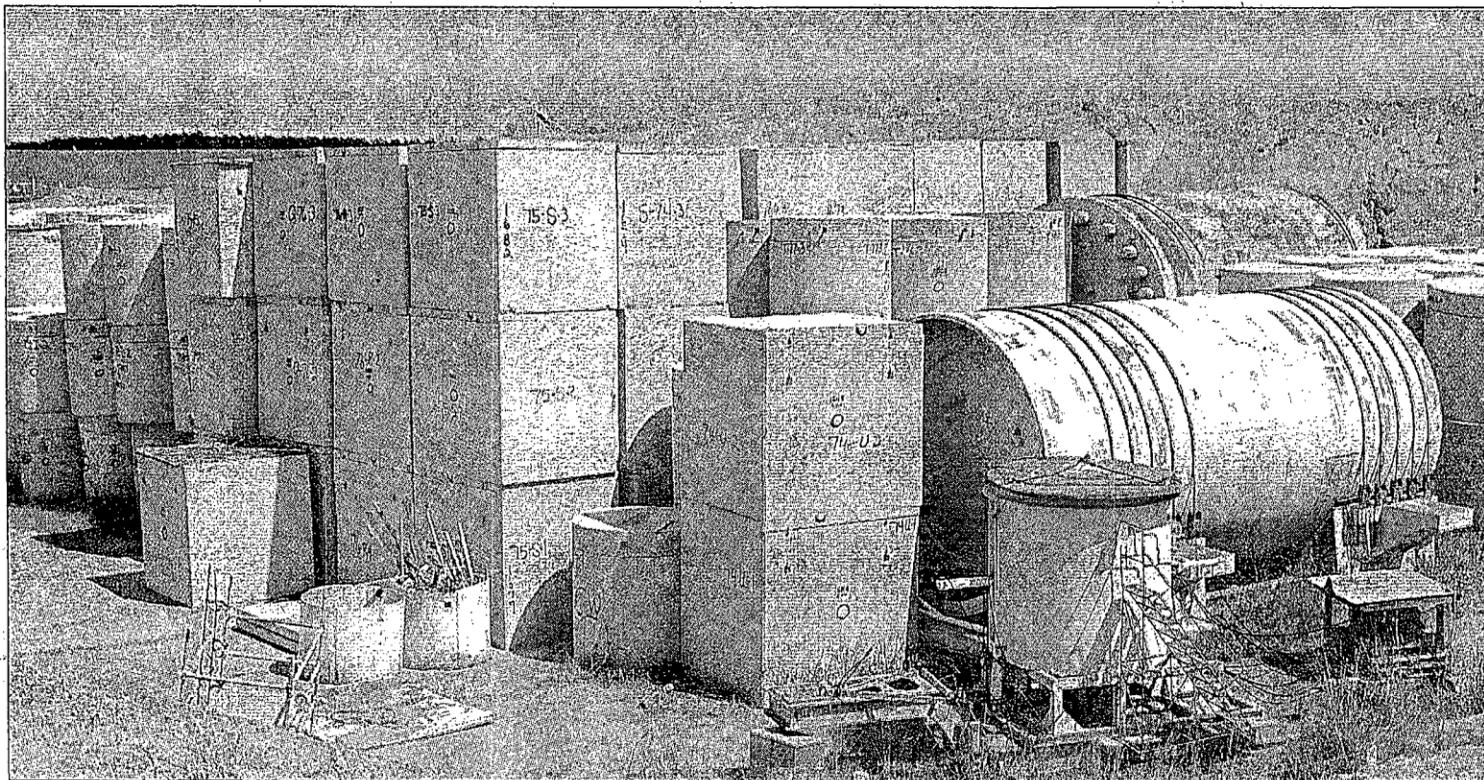
But a South Carolina law that took effect July 1 ended nearly all disposal of radioactive material at the landfill, leaving 36 states with no place to throw out some of the stuff. So labs, universities, hospitals and manufacturers are storing more and more of it on their own property.

"Instead of safely secured in one place, it's stored in thousands of places in urban locations all over the United States," said Rick Jacobi, a nuclear-waste consultant and former head of a Texas agency that unsuccessfully tried to create a disposal site for that state.

State and federal authorities say the waste is being monitored, but they acknowledge that it is difficult to track and is inspected as little as once every five years. Government documents and dozens of Associated Press interviews with nuclear-waste generators, experts, watchdogs and officials show that thousands of these small radioactive items have already been lost, and that worries are growing.

"They'll end up offered up on eBay and flea markets and sent to landfills or metal-recycling plants — places where you don't want them to be," said Stephen Browne, radiation-control officer at Troxler Electronic Laboratories, one of the world's largest manufacturers of industrial gauges that use radioactive material.

There are millions of radioactive



Waste is secured inside steel drums, encased in concrete vaults in Barnwell, S.C. A new law ended nearly all disposal of radioactive material at the landfill.

VIRGINIA POSTIC / Associated Press

devices in use for which there is no long-term disposal plan. These include tiny capsules of radioactive cesium isotopes implanted to kill cancerous cells; cobalt-60 pellets that power helmetlike machines used to focus radioactive beams on diseased brain tissue; and cobalt and powdered cesium inside irradiation machines that sterilize medical equipment and blood.

Most medical waste can simply be stored until its radioactivity subsides within a few years, then safely thrown out with the regular trash. Some institutions store their radioactive material in lead-lined safes, behind doors fitted with alarms and covered with yellow-and-black radiation warning signs.

Over the last decade, however, 4,363 radioactive sources have been lost, stolen or abandoned, according to a Nuclear Regulatory

Commission report released in February. Though none of the material lost was rated "extremely dangerous" — meaning unshielded, up-close exposure can cause permanent injury within a few minutes and death within an hour — more than half the radioactive items were never recovered, the NRC said.

Since the 9/11 attacks, owners of dangerous amounts of radioactivity have been told by the government to take greater precautions, such as having 24-hour surveillance, erecting barriers, and fingerprinting employees, regardless of whether the devices are in use or stored as waste.

Yet in 2003, the federal Government Accountability Office reported there wasn't even a record of how many radioactive sources existed nationwide. In June, the GAO

concluded that while there had been progress, more must be done to track radioactive material to prevent it from falling into terrorists' hands and ending up in a dirty bomb, or one that uses conventional explosives to scatter radiation.

"I don't think we're yet in crisis, but certainly there's information out there to suggest we may be closer to that than is comfortable for me," said Gregory Jaczko, a commissioner with the NRC, one of the agencies charged with tracking the material.

For decades, the government urged states to build landfills for low-level nuclear waste, either on their own or in cooperation with nearby states. But those efforts have run into strong not-in-my-backyard resistance of the sort that led South Carolina lawmakers to

close the Barnwell County landfill to all but three states. Only one low-level landfill, in Utah, has opened in the last 30 years. One more could open in Texas by the end of next year, but it would accept trash from only Vermont and Texas.

Rich Janati, chief of nuclear safety for Pennsylvania's Department of Environmental Protection, said: "It's a national issue, and we should look at it as a national problem and come up with a solution."

The government last week did move to shore up security by requiring hospitals and labs to better secure machines used to irradiate blood. Also, dirty-bomb fears have prompted the National Research Council to urge replacing the roughly 1,300 such machines in the United States with less hazardous but more expensive equipment.

FIRE At Limerick Nuclear Plant During Back-Up Generator Test (1997)



Clouds spew from a cooling tower at PECO's nuclear generating station in Limerick, Pa., in this Feb. 14, 1997, file photo. A fire did minor damage to a non-nuclear section of the Limerick nuclear plant during a test of the backup generators, Thursday, Oct. 9, 1997. (AP Photo/George Widman, file)

**FIRE SAFETY
CONCERNS
AT
LIMERICK
NUCLEAR PLANT**

**NUCLEAR PLANT FIRES
CAN LEAD TO MELTDOWN**

**NRC'S UNPROTECTIVE
FIRE SAFETY POLICIES
JEOPARDIZE OUR REGION**

NRC's Unprotective Fire Safety Policies

BACKGROUND FACTS

- Nuclear plant fires can lead to a meltdown in a variety of ways.
- To assure a fire does not prevent a reactor from safely shutting down,
 - NRC fire safety regulations were in place since 1976 and 1980.
- 3 decades later, NRC is still failing to require full compliance .
- 125 fires were reported at 54 plants since 1995, an average of 10 per year (2008 GAO report).
- NRC should be demanding that the nuclear industry get in full compliance with the most stringent fire safety regulations,
 - INSTEAD of demanding compliance, NRC allowed the nuclear industry to weaken fire safety regulations time after time.

NRC IS PROTECTING NUCLEAR INDUSTRY PROFITS OVER PUBLIC SAFETY!

- NRC acquiesced to the nuclear industry's convenience and bottom line.
- NRC adopted less stringent regulatory requirements to accommodate the wishes of the Nuclear Energy Institute (NEI) to save the nuclear industry money and time.
- NRC admitted rules were developed by NEI and the nuclear industry.
- NRC's current "Fire Safety" fact sheets include words to describe NRC positions such as, "Reduced Regulatory Burden", "Enforcement Discretion", "Exemptions", "Flexibility", and "Safe Enough".
- NRC is literally playing with fire and setting up scenarios at nuclear plants for disastrous consequences. After watching what happened at Fukushima, it is imperative for NRC fire safety policies to become far more stringent.
 - NRC needs to stop blindly dismissing the potential for disastrous consequences from a fire at a nuclear plant.

Fire At Limerick Nuclear Plant Can Lead To Meltdown!

Limerick Does "NOT" Follow The "SAFEST" Fire Safety Regulations

ACE CALLS ON NRC TO:

**REQUIRE THE SAFEST FIRE SAFETY
EQUIPEMENT AND PROCEDURES
OR SHUT LIMERICK DOWN NOW!**

**Grave and serious fire threats make it imperative to
require the safest fire safety procedures immediately!**

NRC is tempting fate with a reckless approach to regulating for nuclear plant fires.

Weaker standards should not be called "safe enough", when so much is at stake.

NRC fails to require the safest fire safety standards to save Exelon money.

NRC jeopardizes our health, our homes and possessions by allowing Exelon to avoid full compliance with the safest fire safety requirements.

NRC abandons its duty in regulatory authority to keep us safe by allowing Limerick to follow a weaker set of fire safety regulations.

Since 2008, ACE tried to get direct answers about Limerick Nuclear Plant's Fire Safety Compliance. July 13, 2010, NRC finally responded to some questions from our June 7, 2010 letter to NRC.

Lax NRC Fire Safety Enforcement of Regulations Could Cause A Meltdown

Fire-Induced Circuit Faults

NRC caved in to the industry, failing to demand full compliance with regulations and failing to hold nuclear plant owners fully accountable through enforcement of violations. NRC is allowing the nuclear industry to avoid full compliance simply by claiming to demonstrate they are "SAFE ENOUGH".

- "Safe Enough" is a highly subjective, unjustified, and unsubstantiated term.
- These have the potential to cause maloperation of equipment important to safe shutdown.

NRC has agreed to NOT impose Violations and Fines on the nuclear industry for failing to fully meet fire-induced circuit fault regulations.

From 1998 to date (12 years) NRC failed to require full compliance, in spite of the potential for disastrous consequences. NRC recognized risks:

- June 3, 1999 NRC documented problems and issued an Information Notice (IN) 99-17, "*Problems Associated with Post-Fire Safe-Shutdown Circuit Analyses*".
- NRC claims "enforcement discretion" is not permanent, but allows "enforcement discretion" to continue to this day. That's not protective and not acceptable.
- **"Enforcement Discretion" Is Dangerously Irresponsible.**

Alternative Fire Protection Rule

NRC should not provide a "voluntary" alternative to NRC's more protective fire protection rule.

NRC allowed less stringent fire safety regulations, increasing risk of disaster. NRC put nuclear industry profits ahead of public safety when acquiescing to nuclear industry convenience.

NRC abandoned more stringent original requirements to endorse NEI and industry developed suggestions for: "Flexibility" - Reduced Regulatory Burdens - Weakened Regulations to Avoid Exemptions.

- NRC reduced so-called "unnecessary regulatory burdens" and "industry exemption requests" to accommodate the nuclear industry and their bottom line.
- "Flexibility" for nuclear plant owners should be a far lower priority to NRC than insuring public safety. "Flexibility" provides convenience for the nuclear industry and likely improves their bottom line, but it clearly does not provide increased protection against fires.

NRC can't even get the industry to comply with weaker regulations.

- NRC is giving the nuclear industry incentives and/or a 6 month extension to follow weaker regulations with which nuclear plant owners should willingly have complied in the past nine years.
- NRC provided certain enforcement discretion as an incentive for nuclear plant owners to adopt weaker NFPA 805 requirements than those required under licensing, yet nuclear plant owners are still resisting the weaker requirements.

Fire Barriers

Tests indicated the material used by the nuclear industry for fire barriers may not provide their designed fire rating. 1-hour and 3-hour rated Thermo-Lag fire barrier material failed to consistently provide its intended protective function.

- NRC publicized conclusions that the fire barrier was indeterminate and began NEGOTIATIONS with the industry for an industry-led resolution, which the industry declined to initiate.
- NRC backed down and concluded corrective actions would not be required.

New Information About Limerick's Design Flaws And Far Greater Risk For An Earthquake

Require The Most Stringent Fire Safety Precautions At Limerick Immediately!

Regarding the risk for an unthinkable disaster due to a fire at Limerick Nuclear Power Plant, ACE believes:

- NRC has a responsibility to require full compliance with all the "SAFEST" fire safety regulation as a condition of Limerick Nuclear Plant relicensing.

NRC's Letter To ACE Validates Cause For Concern

1. NRC admits it has two sets of rules to determine fire safety compliance.

- NRC admits it now has two sets of rules to determine fire safety compliance. One for nuclear plants that adopt the most stringent fire protection plans, and another for those like Limerick that refuse.
- Limerick is NOT using the most protective fire safety materials or plans. Yet, NRC can claim Limerick is in compliance because the NEI and industry developed less protective rules which save Exelon money and time.

2. Exelon refused to adopt the more protective NFPA 805 "Performance-Based Standard for Fire Protection" at Limerick Nuclear Plant.

- Yet, because there are two sets of rules, Exelon and NRC can claim Limerick is in compliance.

Limerick's 26-Year Old Safety Evaluation Report related to the operation of Limerick, dated October 1984 is filled with alarming deviations from NRC guidelines.

Fire Barriers - Fire barriers are designed and constructed to achieve specific fire resistance ratings, and to limit the spread of heat and fire and restrict the movement of smoke.

NRC fire tests from 2001 to 2005 indicated fire barrier materials being used (including Thermo-Lag) did not achieve the fire endurance consistent with its rating.

- Yet, NRC still allows Limerick to use Thermo-Lag.

NRC referred us to a 26 year old 1984 Limerick Fire Safety Evaluation document, even though testing from 2001 to 2005 indicated materials being used by Limerick do not consistently meet rated requirements.

- a. Limerick is still using Thermo-Lag 1-hour protection in several fire areas, even though 1-hour and 3-hour rated Thermo-Lag fire barrier material failed to consistently provide its intended protective function.
 - ✓ NRC allows Limerick to use Thermo-Lag even after issuing numerous communications about Thermo-Lag failures and requesting nuclear plant owners to develop plans to resolve any non-compliances.
- b. Limerick does not use the safest fire barrier systems in all areas, to protect cables important to safe shutdown.

Evidence shows NRC should have been well aware of the risk of weaker fire safety regulations for many years.

- **Yet NRC continues to back down in negotiations with the nuclear industry, even though the outcome of non-compliance with the "SAFEST" fire safety regulations could be catastrophic.**

NRC recognized risks

- **June 3, 1999 NRC documented problems and issued an Information Notice (IN) 99-17, "Problems Associated with Post-Fire Safe-Shutdown Circuit Analyses".**

Given fires can damage control cables, causing operators to lose the ability to shut down and cool the reactor.

- **NRC itself estimated that overall meltdown risk from fire hazards is about 50%, roughly equal to all other hazards combined, yet it appears NRC allows nuclear plants to violate fire safety rules.**

An October, 2008 report to Congress, "*Fire When NOT Ready*", said;

- **All U.S. nuclear plants have been in violation of fire safety rules for more than a decade and therefore at risk of a meltdown from a fire.**

A 2008 Union of Concerned Scientists report suggests that Americans are only protected when fire protection regulations at nuclear power plants are met. UCS's David Lochbaum was quoted saying,

- ***"The only thing more tragic that a nuclear power reactor fire killing Americans is the plain fact that those lives could be been saved had only the NRC bothered to enforce- rather than ignore – its fire protection regulations. I would not want to be in NRC's shoes when they face a grieving nation following a disaster so easily prevented."***

National groups that tracked fire protection non-compliances since the early 1990s, pointed to North Carolina's Shearon Harris plant as emblematic of "*NRC's inept performance as guardian of public health and safety*", and,

- **Called on Congress to wield its power to require NRC to enforce fire safety rules or shut down nuclear plants. They claimed if NRC had been doing its job, dozens of plants would have been shut down until their owners prioritized fixing all the fire safety violations.**

Frustrated NRC Commissioner, Gregory Jaczko, was quoted saying at a public meeting July, 2008:

- **"Simple, straightforward regulations and I don't think there is one plant right now that is in compliance with those regulations."**

Limerick Has Had Fire Safety Violations

Examples:

- 1. Limerick had a fire February, 1997 and other fire safety violations. As of April, 2008 Limerick Nuclear Plant had not adopted all of NRC's fire safety regulations.**
- 2. In 2010 Limerick had fire safety violations. NRC's had lax enforcement in response.**

NRC's failure to require full compliance with all the safest fire safety regulations presents unnecessary risks to millions of people that could be impacted by a fire followed by meltdown at Limerick Nuclear Plant.

Given what is at stake for our region, there is no acceptable excuse for Exelon to avoid full compliance with the safest fire protections.

Even after watching a nuclear nightmare unfold at Fukushima, NRC continues to make unwarranted assurances defending non-compliance, instead of requiring compliance with the safest fire safety regulations.

In fact, for two years, NRC wouldn't give us straight answers about whether Limerick Nuclear Plant was in full compliance with NRC's fire safety regulations.

January 12, 2009 ACE first wrote to NRC, expressing concerns about compliance of fire safety regulations at Limerick Nuclear Power Plant and asking about Limerick Nuclear Plant's compliance status. NRC's response failed to provide a definitive answer.

May 6, 2010, at Exelon's PR session in Royersford, NRC officials were unable or unwilling to answer our questions about Limerick's fire safety compliance.

May 25, 2010 the expert who was supposed to have an answer for us was vague and unresponsive about a requested yes or no if Limerick was in full compliance with NRC fire safety regulations.

- NRC's "Expert" to answer our questions was unable to do that 5/25/10, but he did give us handouts. After careful review of them, ACE was more concerned than ever.
- They confirmed that NRC caved in to the nuclear industry to allow weaker fire safety regulations.

June 7, 2010, ACE again requested detailed written responses to each of our concerns and questions about Limerick's full compliance with fire safety regulations and NRC alarming terms in fact sheets proving NRC's regulations have been weakened.

ALARMING TERMS IN NRC FACT SHEETS ON FIRE SAFETY:

- ✓ **"SAFE ENOUGH"**
- ✓ **"Enforcement Discretion"**
- ✓ **"Flexibility"**
- ✓ **"Reduced Regulatory Burdens"**
- ✓ **"Exemptions"**

Fire-Induced Circuit Faults

NRC caved in to the industry, failing to demand full compliance with regulations and failing to hold nuclear plant owners fully accountable through enforcement of violations.

NRC is allowing the nuclear industry to avoid full compliance simply by claiming to demonstrate they are "SAFE ENOUGH".

- ✓ "Safe Enough" is a highly subjective, unjustified unsubstantiated term.
- ✓ These have the potential to cause maloperation of equipment important to safe shutdown.

NRC has agreed to NOT impose Violations and Fines on the nuclear industry for failing to fully meet fire-induced circuit fault regulations.

- Given what is at stake for our region, there is no acceptable excuse for Exelon to avoid full compliance with fire-induced circuit faults.

"Enforcement Discretion" - Hardly Protective of Public Interests.

From 1998 to date (12 years) NRC failed to require full compliance, in spite of the potential for disastrous consequences.

- NRC claims "enforcement discretion" is not permanent, but allows "enforcement discretion" to continue to this day. That's unprotective and unacceptable.

Alternative Fire Protection Rule

NRC should not provide a "voluntary" alternative to NRC's more protective fire protection rule.

NRC put nuclear industry profits ahead of public safety when acquiescing to nuclear industry convenience over public safety. Allowing less stringent fire safety regulations increases risks of a nuclear disaster.

NRC abandoned more stringent original requirements to endorse NEI and industry developed suggestions For:

- "Flexibility"
- Reduced Regulatory Burdens
- Weakened Regulations to Avoid Exemptions.

NRC eliminated "unnecessary regulatory burdens" and allowed "industry exemption requests" to accommodate the nuclear industry and their bottom line, not for public safety. "Flexibility" for nuclear plant owners should be a far lower priority to NRC than insuring public safety.

- "Flexibility" provides convenience for the nuclear industry and likely improves their bottom line, but it clearly does not provide increased protection against fires.

NRC can't even get the industry to comply with weaker regulations. NRC is giving the nuclear industry incentives and/or a 6 month extension to follow weaker regulations with which nuclear plant owners should gladly have complied in the past nine years.

- NRC provided certain enforcement discretion as an incentive for nuclear plant owners to adopt weaker NFPA 805 requirements than those required under licensing, yet nuclear plant owners are still resisting the weaker requirements.

Fire Barriers Tests indicated the material used by the nuclear industry for fire barriers may not provide their designed fire rating.

- 1-hour and 3-hour rated Thermo-Lag fire barrier material failed to consistently provide its intended protective function. NRC publicized conclusions that the fire barrier was indeterminate and began NEGOTIATIONS with the industry for an industry-led resolution, which the industry declined to initiate. NRC backed down and concluded corrective actions would not be required

NRC'S 7-13-10 Response to ACE Confirmed 2 Versions Of Fire Safety Regulations

NRC Allows Limerick To Follow Weaker Fire Regulations.

NRC acknowledged Limerick did NOT commit to adopting even weaker fire safety regulations - NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants."

NRC said Limerick is NOT Required to adopt even weaker fire safety regulations.

1-hr. and 3 hr. rated Thermo-Lag fire barrier material failed to consistently provide its intended protective function.

- **Limerick was allowed to use 1-hour Thermo-Lag when fires could last far longer than 1 hour and could potentially lead to meltdown.**

LAX NRC ENFORCEMENT FOR 2010 VIOLATIONS

NRC'S 11-9-10 letter to Exelon acknowledged 2 FIRE Violations, but NRC chose to treat them as Non-Cited Violations, even though NRC determined that these violations were "more than minor".

7-29-10

Twice - The latching mechanism failed to function on a required fire door between the reactor enclosure and turbine building.

- **Exelon failed to take action to address the degraded condition and failed to set up a required hourly fire watch.**
 - ✓ The door hardware was no longer functional for securing the door in a closed position.
 - ✓ An hourly fire watch was required for the inoperable fire door - BUT EXELON FAILED TO ESTABLISH AN HOURLY FIRE WATCH.
 - ✓ Exelon workers determined conclusions that the door was operable based on an evaluation performed in 1999.
 - ✓ In 1985, Exelon determined the mechanical latch for the door was replaced with a magnetic latch.
 - ✓ The modification invalidated the equivalency to a rated three-hour fire door.

➤ **NRC'S DANGEROUSLY IRRESPONSIBLE FAILURE TO
CONFRONT FIRE SAFETY COMPLIANCE IS NOT
ACCEPTABLE AFTER WE SEE WHAT CAN HAPPEN.**

LAX FIRE SAFETY

At Limerick Nuclear Plant Jeopardizes Our Region

NRC's UNPROTECTIVE FIRE SAFETY POLICIES MUST BE CHANGED AT LIMERICK NOW

A nuclear power plant fire can ignite a disaster beyond our technological control and our worst nightmare. Fire at Limerick could lead to a meltdown and catastrophe.

Yet, NRC dismisses potentially disastrous consequences and fails to enforce strict compliance even with weakened regulations.

NRC regulations include protection involving fire barriers, fire detection and suppression systems, and spatial separation, all to make safe shutdown possible if fire erupts in the many ways it can at a nuclear plant.

Liability limits encourage cutting corners to save money. It appears that is what is going on with fire safety. The consequences of failing to fully comply with fire safety regulations could cause unthinkable devastation, yet the casual NRC attitude expressed to ACE about a nuclear plant fire was alarming.

Given the potential consequences, NRC can no longer cave in to the nuclear industry's demands for cutting corners to save money. NRC must start to enforce important fire safety regulations. Nuclear plant owners enjoy financial liability limits dwarfed by damage they could do. NRC's most recent estimate of damage from a nuclear plant catastrophe is \$1 Trillion, only \$11 Billion of which would be paid by nuclear plant owners.

NRC has failed to provide enforcement of important safety regulations related to extremely dangerous threats at Limerick Nuclear Plant.

It is inexplicable that after decades Limerick Nuclear Plant has still not been required to use the safest materials or procedures in regulations. It is unbelievable and unacceptable that NRC allows Limerick to follow a different set of fire safety requirements, which NRC calls "safe enough".

NRC MUST ENFORCE CRUCIAL FIRE SAFETY REQUIREMENTS AT LIMERICK

The Nuclear Regulatory Commission has a legal responsibility to ensure American nuclear reactors are not operated dangerously. There has been widespread concern that it isn't doing what it's supposed to do. Recently, there is proof of NRC dysfunction resulting in potential great danger.

NRC must stop from undoing of safety requirements necessary to prevent a catastrophic meltdown at Limerick Nuclear Plant. A summary of the issues positions is below.

- NRC "exemptions" from fire safety requirements that had been in the regulations and requirements for 30 years.
- In 1980, after a near catastrophic meltdown at the Browns' Ferry Alabama nuclear reactor, the NRC required all nuclear facilities to install fire insulation around the electric cables that allow the reactor to shutdown in an emergency.
- For 30 years the NRC's Rules have required that the fire insulation must protect these cables for at least one hour, enough to order and complete a shutdown.
- Five years ago the NRC discovered that the cable fire insulation in many reactors lasted only 27 minutes.
- Rather than force owners to upgrade the insulation so that it last an hour, the NRC secretly granted an "exemption". Now the insulation has to last only 24 minutes.
- That means that a fire at an electric cable has to be discovered, located and extinguished by fire personnel in 24 minutes. In many cases that is physically impossible.
- A meltdown that could occur would be real and irreversible.
- Battles are being fought to reduce the risk of a catastrophic meltdown, including a lawsuit trying to make the NRC enforce its own fire safety standards.
- The Atomic Energy Act, which gives the NRC all its powers and responsibilities, does not give the NRC the power to issue a fire safety exemption.
- The NRC can't make important decisions affecting the public health and safety in secret. The NRC intentionally refused to consider strong evidence that you can't discover, locate and put out a fire in 24 minutes. The "exemption" is a clear and present danger to the health and safety of almost 8 million people who live close to Limerick.

As long as Limerick continues to operate, this heavily populated region faces unnecessary catastrophic risk from a fire related nuclear disaster.

- **We simply can't afford a disaster at Limerick Nuclear Power Plant, in human, environmental, or financial terms or costs.**

GAO faults nukes over fire safety

WASHINGTON — Operators of nuclear power plants have yet to comply with some of the government's fire-safety rules three decades after they were issued, a congressional report said yesterday.

The Government Accountability Office said 125 fires were reported at 54 plants since 1995, an average of nearly 10 a year, though none threatened safe emergency-reactor shutdown or posed significant safety threats. The fires were mostly electrical or maintenance-related.

But the GAO study said the Nuclear Regulatory Commission had been unable to resolve "several long-standing issues" with the industry over fire safety, including full compliance with NRC rules put in place in 1976 and 1980 as a result of the fire at the Browns Ferry plant in Alabama in 1975, the worst fire ever at an American nuclear plant. The nuclear industry had no immediate comment.

— AP

7-1-08 P mg

Alliance For A Clean Environment
1189 Foxview Road Pottstown, PA 19465

June 7, 2010

Paul Krohn, NRC Branch Chief

NRC, Region 1
475 Allendale Road
King of Prussia, PA 19406-1415

RE: NRC's 5/25/10 Meeting and Unprotective Fire Safety Policies

Dear Mr. Krohn,

This letter is a follow-up to the NRC meeting at the Limerick Township Building May 25, 2010 regarding fire safety. Many of NRC's responses to our concerns and questions need to be clarified. Since different NRC individuals appear responsible for specific issues, we decided to ask NRC to respond to each issue separately about which we have concerns and questions. ACE will be sending separate letters about several issues discussed with us at NRC's meeting plus issues from our review of NRC fact sheets provided at that meeting.

In this letter we will address our long-term fire safety concerns at Limerick Nuclear Power Plant. ACE first contacted you about Limerick's fire safety January 12, 2009. Your response failed to answer our specific questions. At the May 6, 2010 Exelon public relations event, NRC representatives still failed to answer if Limerick was in full compliance with all fire safety regulations. We were told NRC would be prepared to answer that questions at the 5/25/10 NRC meeting.

The NRC official presented to us at the 5/25/10 meeting as the NRC expert on fire safety was vague and unresponsive to our request for a simple yes or no answer to our question about whether Limerick is in full compliance with fire safety regulations. Most disturbing was his casual attitude about what we view as a crucial issue. Full compliance with fire safety regulations can help to prevent a fire that could cause a meltdown and disaster at Limerick Nuclear Power Plant in our region. After what has happened in the Gulf, and knowing that fires at nuclear plants can lead to a nuclear plant meltdown and disaster, we think NRC should be taking a far more serious and protective approach to strict nuclear plant compliance with fire safety regulation.

NRC's fire safety expert said to get a yes or no we would have to be specific. We object to his assertion that the public is expected to know fire safety regulatory details to get a straight yes or no answer about Limerick's full compliance with fire safety regulations. After repeated requests, he finally claimed Limerick was in full compliance. He handed us NRC fire safety fact sheets, none of which turned out to be anything specific about Limerick's fire safety compliance, which was the point of our question.

After careful review of NRC's fire safety fact sheets we are more concerned than ever. It appears NRC caved in to the nuclear industry, just like MMS with deep sea mining safety. ACE identified the issues below. We are requesting detailed written responses to each comment and question.

Fire-Induced Circuit Faults

These have the potential to cause maloperation of plant equipment important to safe shutdown. In 1998, NRC identified inconsistency between positions of the industry and NRC regarding regulations concerning fire-induced circuit failures.

- To avoid NRC enforcement for industry non-compliance, NRC irresponsibly instituted enforcement discretion, allowing the industry to implement compensatory measures, such as staging fire watches for identified circuit failure.
- When NRC or nuclear plant operators identify a fire-induced circuit failure issue, NRC has irresponsibly allowed nuclear plant owners that can't meet requirements, to apply to NRC for

permission to deviate from regulatory requirements by demonstrating to NRC they can ensure they are safe enough.

ACE believes it is negligent for NRC to allow nuclear plant owners to avoid full compliance with fire safety requirements for fire-induced circuit faults simply by claiming to demonstrate they are "safe enough".

- ✓ "Safe Enough" is an unsubstantiated term that can't be justified. This highly subjective standard is not sufficiently protective, given the potential for a fire to turn into a meltdown with disastrous consequences. What does "safe enough" mean? Something is only "safe enough" until it isn't, as in the Gulf of Mexico.
- ✓ It seems impossible to prove anything is "safe enough", short of starting a fire. Explain with specific details what NRC accepts from nuclear plant owners as proof that their plants are "safe enough" without full compliance with NRC's fire-safety regulatory requirements.

Violations and fines for failing to fully meet fire-induced circuit fault regulations will not be imposed on the nuclear industry by NRC.

- ✓ Where is the incentive for nuclear plant owners to comply with NRC fire safety requirements? **NRC caved in to the industry. NRC failed to hold licensees fully accountable, allowing the nuclear industry to avoid full compliance with regulations and enforcement for violations.**
- ✓ This is yet another example of why the public believes NRC is more interested in protecting nuclear industry profits over public safety.

Questions about Limerick:

- 1) **Is Exelon fully in compliance with NRC's fire-induced circuit fault regulations at Limerick Nuclear Power Plant?**
- 2) **OR, is Exelon claiming Limerick Nuclear Plant is "safe enough" to avoid meeting the most protective fire-induced circuit fault regulations and what credible specific evidence of "safe enough" at Limerick has Exelon provided to NRC?**

Given what is at stake for our region, there is no acceptable excuse for Exelon to avoid full compliance with fire-induced circuit faults.

"Enforcement Discretion" is NOT PROTECTIVE

With much at stake with fire safety regulations, NRC, the agency responsible for protecting public safety, should end any nuclear industry "enforcement discretion". NRC is playing with fire. After what happened in the Gulf of Mexico, it is time for NRC to stop blindly dismissing the potential for disastrous consequences from a fire at a nuclear plant.

Facts show cause for concern.

- June 3, 1999 NRC documented additional problems and issued an Information Notice (IN) 99-17, "*Problems Associated with Post-Fire Safe-Shutdown Circuit Analyses*".
- December 2005, NRC issued a Regulatory Issue Summary, "*Clarification of Post-Fire Safe- Shutdown Circuit Regulatory Requirements*."
- April 2009, NRC Proposed Revision 2 of Regulatory Guide (RG) 1.189, "Fire Protection for Nuclear Power Plants" – Guidance of analyzing and addressing fire-induced circuit failures.

- ✓ **From 1998 to date (12 years) NRC has failed to require full compliance with its fire-induced circuit fault regulations, in spite of the potential for disastrous consequences.**
 - ✓ **NRC claims "enforcement discretion" is not permanent, yet NRC allowed "enforcement discretion" continues to this day. That is both unprotective and unacceptable.**
- **It's long past time for NRC to stop caving in to the demands of the nuclear industry to protect their bottom line, and instead demand that the nuclear industry get in full compliance with the most stringent fire safety regulations.**

Alternative Fire Protection Rule

In 2001, in lieu of NRC's existing fire protection licensing basis, NRC modified its fire protection regulations to allow nuclear owners to adopt, on a voluntary basis, National Fire Protection Association (NFPA) Standard 805.

- For NRC to reduce so-called "unnecessary regulatory burdens" and "industry exemption requests" associated with the current deterministic approaches was clearly to accommodate the nuclear industry, not for public safety. NRC should not have provided a "voluntary" alternative to NRC's more protective fire protection rule.

Troubling Issues

NRC abandoned more stringent original requirements to endorse the NEI and industry suggested "flexibility", reduced regulatory burdens, and weakened regulations to avoid exemptions.

- **NRC put nuclear industry profits ahead of public safety. NRC acquiesced to nuclear industry convenience over public safety.**
 - With a vested interest in the outcome, the Nuclear Energy Institute (NEI) and the nuclear industry developed the guidance accepted by NRC for implementing this new fire safety program involving more nuclear industry flexibility and reducing the regulatory burden associated with fire protection requirements, and reducing the need for licensee exemptions to current requirements.
- **"Flexibility" for nuclear plant owners should be a far lower priority to NRC than insuring public safety.**
 - "Flexibility" provides convenience for the nuclear industry and likely improves their bottom line, but it clearly does not provide increased protection against fires.
- **Original fire safety regulations were established to prevent a nuclear disaster as a result of a nuclear plant fire. Allowing less stringent fire safety regulations increases risks. NRC reduced regulatory requirements to accommodate the wishes of NEI and the nuclear industry to save time and money. NRC clearly valued nuclear industry profits over safety.**
 - NRC admits rules, developed by NEI and the nuclear industry, are expected to reduce regulatory burdens and the need for license exemptions and amendments, yet NRC approved these rules.
- **NRC can't even get the industry to comply with weaker regulations. NRC is giving the nuclear industry incentives and/or a 6 month extension to follow weaker regulations with which nuclear plant owners should gladly have complied in the past nine years.**
 - NRC provided certain enforcement discretion as an incentive for nuclear plant owners to adopt weaker NFPA 805 requirements than those required under licensing, yet nuclear plant owners are still resisting the weaker requirements.
 - ✓ 2006 NRC endorsed the nuclear industry proposal to provide timely clarification of issues emerging at plants transitioning to NFPA 805.
 - ✓ March 2009, 51 reactor units had sent letters of intent, indicating commitment to adopt NFPA 805. NRC issued Revision 1 of RG. 1.205 December, 2009.
 - ✓ 47 reactor units can request an extension of enforcement discretion time to 6 months after the 2nd pilot plant safety evaluation is issued.

Questions about Limerick:

- 1) **Is Limerick Nuclear Power Plant in full compliance with the most stringent fire regulations?**
- 2) **Or is Limerick one of the 47 reactors that won't even commit to immediately adopting the weaker standards?**
- 3) **Specifically, as of June 2010, has Limerick adopted NFPA 805 and is Limerick in full compliance with that?**

Fire Barriers

Even after review of fact sheets, it is still unclear if NRC caved in to the nuclear industry regarding regulations and guidelines to ensure that nuclear plants can be safely shut down in the event of a fire.

Tests indicated the material used by the nuclear industry for fire barriers may not provide their designed fire rating. 1-hour and 3-hour rated Thermo-Lag fire barrier material failed to consistently provide its intended protective function.

There is widespread use of this questionable effective Thermo-Lag fire barrier material by the nuclear industry.

NRC issued numerous generic communications to inform licensees of Thermo-Lag failures and requested nuclear plant owners to develop plans to resolve any noncompliances with fire protection regulations.

- ✓ In 1999 inspectors discovered the fire endurance tests at Shearon-Harris did not satisfy the Generic Letter.
- ✓ NRC publicized conclusions that the fire barrier was indeterminate and began NEGOTIATIONS with the industry for an industry-led resolution.
- ✓ The industry declined to lead this initiative for a fire barrier resolution.
- ✓ NRC backed down and concluded corrective actions would not be required
- ✓ NRC fire tests from 2001 to 2005 indicated that the material used by the nuclear industry did not achieve the fire endurance consistent with its rating.
- ✓ In 2006, NRC issued Generic Letter 2006-03, "Potentially Nonconforming Hemyc and MT Fire Barrier Configurations".

September 2009, NRC published "Draft NUREG-1924, Electric Raceway Fire Barrier Systems in US Nuclear Power Plants" for public comment.

Questions about Limerick:

1. What is the current state of fire barrier use at Limerick Nuclear Power Plant?
2. Is Limerick still using Thermo-Lag or Hemyc anywhere on the site? If so, in what areas?
3. Please provide the complete review done on Limerick's individual use of ERFBS.
4. Has Limerick applied for exemptions?
5. Has Limerick received any exemptions?

Since fires can trigger meltdowns and since fire barriers are designed and constructed to achieve specific fire resistance ratings, and to limit the spread of heat and fire and restrict the movement of smoke, we believe the public deserves clear, easy to understand answers, with full disclosure.

We were told by NRC's "fire expert" in order to get specific answers, we needed to ask specific questions. We spent much time carefully reviewing NRC fact sheets and we have attempted to do that in this letter. Given the potential for an unthinkable disaster at Limerick Nuclear Power Plant, ACE believes NRC now has a responsibility to answer all our specific questions and concerns in this letter, clearly and specifically. Please don't yet again send us more websites, more generic fact sheets, and more non-answer responses. We await your timely response.

Thank You,

Dr. Lewis Cuthbert
ACE President

Cc: Senator Casey
Senator Specter
Congressman Sestak
Congressman Gerlach
Congressman Dent
Governor Rendell
Senator Rafferty
Senator Dinniman
Representative Quigley
Representative Hennessey
Representative Vereb

NRC

**Weakened And/Or Ignored
Safety Rules**

At Limerick Nuclear Plant

**That Saves Exelon Money
But Further Jeopardizes Our Region**

"Safety Myth" Is Dangerous

**Despite a Body of Evidence Of
Significant Risk and Harm
Related to Limerick Nuclear Plant Operations
NRC and Exelon "Claim" Limerick is "Safe"**

"Safety Myth" Left Japan Ripe for Nuclear Crisis

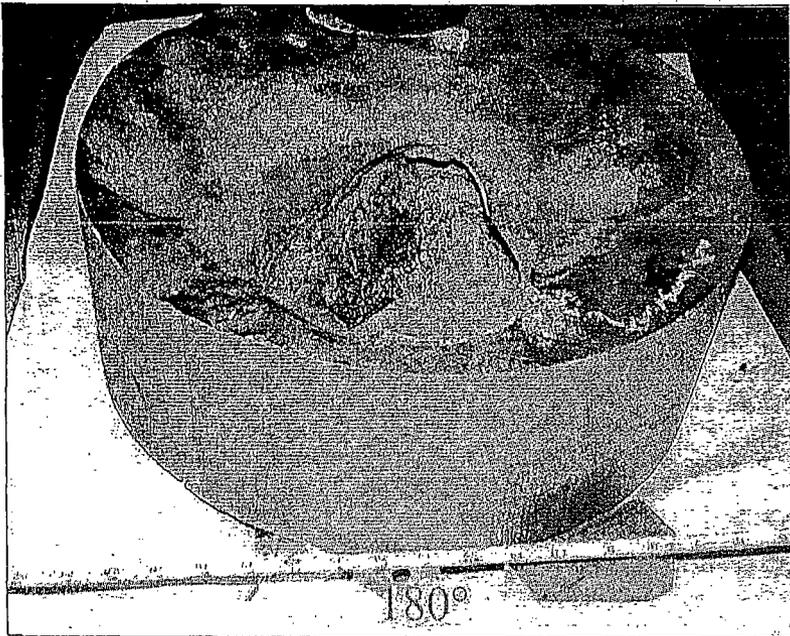
N.Y. Times 6-25-11

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U.S. nuke regulators weaken safety rules



AP Photo

This photo made available by the Nuclear Regulatory Commission shows a 5-by-5-inch hole in a section cut from the top of the reactor vessel at the Davis-Besse nuclear plant in Ohio.

AP investigation: Standards being compromised to keep plants running

First of four parts.

By Jeff Donn
AP National Writer

LACEY TOWNSHIP, N.J. — Federal regulators have been working closely with the nuclear power industry to keep the nation's aging reactors operating within safety standards by repeatedly weakening those standards, or simply failing to enforce them, an investigation by The Associated Press has found.

Time after time, officials at the U.S. Nuclear Regulatory Commission have decided that original regulations were too strict, arguing that safety margins could be eased without peril, according to records and interviews.

The result? Rising fears that these accommodations by the NRC are significantly undermining safety — and inching the reactors closer to an ac-

cident that could harm the public and jeopardize the future of nuclear power in the United States.

Examples abound. When valves leaked, more leakage was allowed — up to 20 times the original limit. When rampant cracking caused radioactive leaks from steam generator tubing, an easier test of the tubes was devised, so plants could meet standards.

Failed cables. Busted seals. Broken nozzles, clogged screens, cracked concrete, dented containers, corroded metals and rusty underground pipes — all of these and thousands of other problems linked to aging were uncovered in the AP's yearlong investigation. And all of them could escalate dangers in the event of an accident.

Yet despite the many problems linked to aging, not a single official body in government or industry has studied the overall frequency and potenti-

(See AGING NUKES on A3)

LIMERICK NUCLEAR PLANT

MAJOR CONCERNS

DESIGN FLAWS

DETERIORATION

CORROSION

MECHANICAL BREAKDOWN

ACCIDENTS

**WEAKENED REGULATIONS WITH
LAX OVERSIGHT AND ENFORCEMENT**

ACE CONCLUDED TO PROTECT THE

ENVIRONMENT

HEALTH

ECONOMY

IN THE ENTIRE PHILADELPHIA REGION

LIMERICK MUST BE CLOSED

NOT RELICENSED

PREVENTION AND PRECAUTION ARE IMPERATIVE

- ✓ **After An 11-Year Investigation On Limerick's Harms and Threats**
- ✓ **After Watching Japan's Nuclear Disaster Unfold**
- ✓ **After Recently Learning About Limerick's Design Flaws**
- ✓ **After Reviewing Limerick's Lists Of Unplanned Shutdowns**

While all the signs of Limerick's aging, deterioration, and corrosion are too numerous to mention in this report, we believe an honest, intensive evaluation of Exelon's own relicensing application, along with the body of evidence provided to NRC from ACE, should result in NRC saying NO to relicensing Limerick for 20 more years.

Our hopes and prayers are that our region doesn't face a catastrophic meltdown before that time.

Why Close Limerick Nuclear Plant Rather Than Relicense To 2049?

1. Design Flaws

Limerick has design flaws that could lead to meltdown and to more radiation released in the event of a meltdown.

- Some Limerick Systems, Structures, and Components Could Be Unreliable If An Earthquake Occurs. With Limerick 3rd on the Earthquake Risk List, This is Alarming.
- Flood and Fire Prevention Seals May Not Tolerate A Seismic Event.
- Control rods might not fully insert to perform the required safety function, a substantial safety hazard.
- It may not be possible to make corrections in design flaws in fire safety related areas.
- Limerick's Containment is Substandard - More radiation would be released in a meltdown.
- Limerick's Fuel Pools Are Vulnerable (Like Japan's) - Not under same containment as generators.

Limerick's design could not be built today. It is neither logical nor appropriate to extend the license beyond 2029.

2. Shutdowns

Limerick has had far too many unplanned shutdowns.

Examples Reported In The Newspaper

3 Unplanned Shutdowns Occurred Within 1 Week - Reported June 4, 2011

1 February 26, 2011 A Limerick Shutdown Was Reported Lasting Over 2 Days

1 June 23, 2010 - Limerick Shutdown Reported - Loss of Both Limerick's Reactor Recirculation Pumps caused a Manual Shutdown of Limerick's Unit One

5 Unplanned Shutdowns Occurred At Limerick Nuclear Plant In 1 Year (2007-08)

- ✓ All these unplanned shutdowns suggest problems, yet NRC uses a "rolling average" to dismiss public concern. NRC failed to increase oversight, and failed to take the shutdowns seriously enough to do an independent investigation for cause. How can we trust NRC? Exelon and NRC claim they don't know what is causing shutdowns, but claim there is no risk.
- ✓ Three unplanned shutdowns occurred in just 3 months and involved unit 2 - February to April 2008 - Yet NRC failed to provide a written explanation in response to ACE's request.
- ✓ As of April, 2008 Exelon could not or would not identify the root cause of the 2/2/08 shutdown.
- ✓ April 24, 2007 shutdown was the result of a low coolant level. 15 days later the problem was still under investigation, yet Exelon claimed no risk to the public. Low Coolant levels can lead to meltdown.
- ✓ April, 9, 2007 - 5 days after refueling, there was another unplanned shutdown due to a seal on a pump.

3. Materials Degradation

Like a car, the longer and harder you run it, the more chance for problems.

When it's a nuclear plant, those problems can be catastrophic.

- Percent (%) of time Limerick Nuclear Plant is in operation will increase risk of mechanical breakdown and disaster. From 1999-2005, Limerick reactors were already operational 96.7% / 96.3% of the time, according to NRC data through February 2005.
- Limerick is trying to get 20% Uprates, which would increase risk.

Materials Degradation

A Concern Right Now - Not Future Speculation

An NRC Whistleblower said, "*I have seen nuclear plants experience*":

- Cooling Towers Collapsing
- Leaks In Underground Piping
- Circumferential Crack Indications in a pressurizer nozzle weld
- Spent Fuel Pool Leaks
- Transformer Failures
- Tritium Leaks
- Degraded Underground Cables
- Other Issues

What Kind of Materials Degradation Will Limerick Nuclear Plant Experience:

- ✓ **Due To Uprates?**
- ✓ **Operating Until Limerick's License Expires in 2029?**
- ✓ **If Relicensed for Another 20 Years?**

4. Historic Problems

Indicators That Limerick Equipment Problems Existed For Years.

Limerick has had many problems over the years. See Attachments for examples of problems reported in the newspaper. Other examples:

- ✓ Limerick Had 2 Near Misses - Identified In NRC Documentation (Reported by Greenpeace):
2 "near misses" at Limerick Nuclear Plant – Unit 1 in 1995, Unit 2 in 2001
- ✓ Limerick Had Crack in the Moat That Went Inadequately Addressed For Years – Details Available
- ✓ Issuance of Amendment to Limerick's Operating License, under Proposed Significant Hazardous Consideration Determination, and Opportunity for a Public Hearing by the Nuclear Regulatory Commission.

Both Limerick's fans of the 2D drywell unit cooler were

inoperable and out of service.

This consideration of Significant Hazards was serious enough to trigger the consideration of an amendment to Limerick's operating permit for Unit 2 and an opportunity for public comments and a public hearing. The combination of an increase in the drywell average air temperature during the summer months and the standard regulatory process for noticing license amendment requests could have resulted in a Limerick Nuclear Plant shutdown.

- ✓ Proposed Significant Hazards Consideration Determination - June 20, 2006 - This was serious enough for NRC to consider an amendment to Limerick's operating permit for Unit 2.
 - ✓ Both fans of the 2D drywell unit cooler were inoperable and out of service, which resulted in an increase in drywell average air temperature from approximately 129 degrees F to approximately 142 degrees F.
 - ✓ An evaluation of components in the drywell determined that the capability to perform their safety function was okay for the qualified life for the remainder of the current operating cycle. Given NRC's track record, that may or may not be true.
- **This is just one important example of why Limerick must be closed in 2029 when its current license expires.**

U.S. NRC Safety Evaluation Report Related to the Operation of Limerick Generating Station Units 1 and 2 October 1984

This report, from the NRC Office of Nuclear Reactor Regulation in 1984, identified several deviations from guidelines, that were allowed at that time to Philadelphia Electric Company:

- NRC allowed numerous deviations from 3 hour rated barrier fire safety guidelines for 2 hour barriers, 1 1/2 hour rated doors, insulation, or sprinkler systems
- NRC allowed reduced systems for hot and cold shutdown capabilities free of fire damage
- NRC allowed the hydrogen piping in safety related areas that was designed to seismic Category I requirements
- NRC allowed lighting and communication cables, as non-safety systems, to be routed in conduit instead of all metal cable trays
- NRC allowed the absence of ventilating systems designed to specifically exhaust smoke or other products of combustion, approving the use of portable smoke ejectors

The number of deviations and alternate approvals provided to PECO for Limerick in 1984 is indicative of the deference shown to nuclear plant operators even then. It is evident that the original design, with its intended 40 year expected life, could not be built and approved in 2011. It makes no sense to relicense Limerick for an additional 20 years after its expected closing in 2029.

Indications of Equipment and Materials Deterioration, Mechanical Problems and Breakdowns, and Accidents at Limerick

Listed below are several examples that occurred at Limerick in May and June 2011:

- Two unexpected shutdowns or "SCRAM" events were experienced less than 36 hours apart at Unit 2 in May 2011
- The Pottstown Mercury reported on both shutdowns June 1, 2011, and referenced previous shutdowns in February 2011 and June 2010 citing problems with recirculation pumps
- Mechanical problems involving pumps, control valves, or switches occurred in February, April, May, and June 2011

Additional concerns with the equipment at Limerick include:

- After 40 years of operation, the reactor vessel at Limerick has been subjected to stress, and has become embrittled, exposing the vessel to cracking
- Several serious malfunctions have occurred with Exelon failing to identify the root cause(s) prior to restarts of the reactor for NRC or the public
- Several instances of equipment malfunction or failure have occurred with Exelon failing to identify a determination of corrective action
- It is evident that NRC has been complacent in allowing Exelon to restart reactors without identifying and correcting the root cause(s) involved
- It is apparent that NRC failed to address embrittlement concerns, as well as serious threats to the environment and public safety raised in a 2011 petition filed by Thomas Saporito, on a technicality rather than the issues identified

This history highlights the seriousness of the events that have occurred during the brief period of six months at Limerick. SCRAM events, or any events where the nuclear reactor automatically shuts down or trips off, place substantial stress on the entire nuclear reactor system and supporting equipment. Units 1 and 2 at Limerick are operating near or at the end of their safety design basis and functional lives.

U.S. NRC Plant Inspection Findings Reported First Quarter 2011 for Limerick Unit 1

The attached report from the NRC identified five categories of findings / violations for Limerick Unit 1, which occurred between September and December 2010:

- Latching mechanism malfunction finding (September 2010)
- Multiple failures to revise the Updated Final Safety Analysis Report as required (December 2010)
- Unreliable unit coolers (3 of 4) due to various planned and unplanned conditions (December 2010)
- Failure to take compensatory action for an inoperable fire door (September 2010)
- Failure to perform adequate preventive maintenance on emergency diesel generators bypass valves (September 2010)

The attached report from the NRC identified four categories of findings / violations for Limerick Unit 2, which occurred between September and December 2010:

- Multiple failures to revise the Updated Final Safety Analysis Report as required (December 2010)
- Unreliable unit coolers (3 of 4) due to various planned and unplanned conditions (December 2010)
- Failure to take compensatory action for an inoperable fire door (September 2010)
- Failure to perform adequate preventive maintenance on emergency diesel generators bypass valves (September 2010)

ACE is concerned that this many findings, violations, and failures by Exelon in just one three month period in 2010 may indicate the ominous potential for increasingly frequent mechanical breakdowns in the future of aging and deteriorating equipment at Limerick.

THERE ARE OTHER TROUBLING ISSUES:

Dominant Core Damage - Sequence

Failures of:

- ✓ Offsite Power Recovery in 5 to 10 hours
- ✓ Recirculation pump seals
- ✓ High Pressure Coolant Injection

15 Day Repair Period

Run Time Between Failure - May 5 and 24 - 2010 (Repair Time)
Exposure Period - 19 DAYS

Between April 5 and May 5, 2010 - Run Time Failure 22 Hours
Exposure Period - 30 DAYS

Cross Cutting Aspect

- ✓ Human Performance
- ✓ Resources

Exelon failed to provide complete, accurate and up-to-date documentation.

June 23, 2010

Supply Cable Faulted - Tripped over current -
Resulted in LOSS OF POWER to the OPERATING WATER COOLING PUMP-

April 29, 2010

Incorrect Calculating of Radiation Monitor Being Used.

Radiation monitor INOPERABLE from 3-19-10 to 4-22-10 (over a month)

**There Are Inherent and Growing Risks
For A Radioactive Disaster At Limerick Nuclear Plant
From Mechanical Failure and Accidents!**

***FACT: It Doesn't Take An Earthquake
To Lose Power And Cooling Water
That Can Lead To Meltdown***

IT WOULD BE NEGLIGENT TO RELICENSE LIMERICK

In 1981, even before Limerick was built, NRC was sued in federal court, accusing NRC of violating the National Environmental Policy Act by not forcing PECO to consider Safety Enhancing Design Alternatives for Limerick Nuclear Power Plant.

- ✓ From the beginning, PECO cut corners to save money.
 - NOTE: Bectel, the same company that built Limerick, installed a reactor vessel at San Onofre backwards in 1977 and was forced to redo the job...
- ✓ The 3rd Circuit Court of Appeals in Philadelphia ordered NRC to listen to the proposals for alternatives for improved safety in design, which was a major embarrassment to NRC and a setback for PECO.
- ✓ But the case dragged on nearly nine years, during which time Unit 1 was finished and Unit 2 approved.

When Limerick went into operation in 1985, it was licensed for, and designed to last 40 years. Everything has an expected life span.

It is not credible for NRC to claim the original license for 40 years had nothing to do with aging equipment. Nuclear engineers, who were involved, have said 40-year licenses were based on life expectancy.

AP historical records and interviews with engineers who helped develop nuclear power show:

"Reactors Were Made To Last Only 40 Years" PERIOD!

Everything Reaches An End If Its Life Span

It is not credible for Exelon and NRC to assert that aging is no issue or claim relicensing will be safe because old equipment and pipelines will be replaced.

The nuclear industry admitted,

- **SOME PARTS ARE TOO BIG AND TOO EXPENSIVE TO REPLACE.**

Relicensing aging, dangerous nuclear plants like Limerick is a journey in the unknown.

It's like playing Russian Roulette with millions of lives and the threat of financial ruin in the balance.

- After only 26 years, alarming signs of problems are already evident. Some of the problems could potentially lead to meltdown.
- Of particular concern, the reactor vessel becomes too brittle as do miles of underground buried pipes and cables critical for safe operations.
- Other Major Concerns Are Corrosion and Weakness in Miles of Underground Pipeline Under and Through Limerick.
- Exelon claims they will replace aging parts, but the nuclear industry admitted that some parts are too big and too expensive to replace. It seems the reactor vessel would not be replaced nor all the miles of buried pipelines and cables under and through Limerick. These are crucial for operations.
 - **Complicated Aging Equipment With Miles of 25-Year Old Corroding, Deteriorating, Brittle Underground Pipes and Cables, All Vulnerable to Failures Can Lead To DISASTER.**
- Exelon's history suggests they will cut corners to avoid spending money and use dangerous delay tactics. Fire safety is one example. Exelon avoided compliance with important fire safety regulations at Limerick for decades, then recently agreed to only follow weakened fire safety regulations.

The public deserves independent proof that it would be safe to operate Limerick Nuclear Plant for 60 years. There is no such proof!

- **NRC must say NO to relicensing.**

There are many signs of problems after just 26 years. What could happen after 40 years? There is cause to believe risks will increase from UPRATES.

- **Exelon is planning to run Limerick over 20% harder through "Uprates." 96.7% + over 20% adds up to way over 100%. How could anyone believe or conclude this is does not increase risk for disaster?**

How could anyone believe running any original Limerick equipment harder for another 20 years after relicensing is safe? This makes no sense. It increases Exelon's bottom line, but dramatically increases our risk for a meltdown caused by mechanical failure.

Limerick Nuclear Plant should be closed at least by 2029 when its license expires, to attempt to avoid a Chernobyl type accident at Limerick.

After Watching Japan's Nuclear Disaster:

LIMERICK MUST CLOSE

TO PROTECT THE PHILADELPHIA REGION

**Given The Consequences Of NRC Decisions We Are
Terrified About NRC's Rubberstamp Permitting!**

Associated Press Investigation - Findings Reported 6-20-11
This is significant to every person in the Greater Philadelphia Region

NRC

WEAKENS SAFETY RULES

NRC RUBBERSTAMPS PERMITS!

- NRC and industry rewrite history of operations at nuke plants
"NRC Colluded With Industry To Weaken Safety Standards"
- NRC Weakens Standards With: **"Pencil Engineering"**
**This Policy Significantly Undermines Safety, Inching Reactors
Like Limerick Closer To Catastrophe**
- In an effort to meet safety standards, Aging Reactors are Coming up with:
"Backfit After Backfit" Retired NRC chairman said:
**"It's Like Driving Model T's Today And Trying to Bring Them Up
To Current Mileage Standards."**
- Safety Experts Call NRC Regulating: **"Tombstone Regulation"**
NRC allows problems to fester until something goes very wrong.
"Until There Are Tombstones, They Don't Regulate"
- NRC worked with the nuclear industry to keep Deteriorating, Corroding, Aging,
Dangerous Reactors Operating Beyond their 40-Year Permit, by
"Fudging The Numbers"

- NRC Justified Many Safety Changes With A: **Flawed Process Called "Risk-Informed" Analysis.** Employed widely by industry since the 1990s: Regulators set aside a strict check list applied to all systems. Instead they focus on features deemed to carry the highest risk.

FLAW: Risk-informed analysis doesn't explicitly account for age.

- An older reactor is not viewed as inherently more unpredictable than a younger one.
- Ed Lyman, a physicist with the Union of Concerned Scientists, says risk-informed analysis weakens regulations, rather than strengthen them."

Examples of Dangerous Deception:

- When Valves Leaked NRC Allowed Up To 20 Times More Than The Original Leakage Limit.
 - Valves to Confine Steam to the Reactor in Accidents at BWR like Limerick Were Originally Permitted to Leak at 11.5 Cubic Feet Per Hour - 1999, the Limit was Relaxed to 200 Cubic Feet Per Hour. Bigger Leaks Still Occur.
 - When Cracking Caused Radioactive Leaks From Steam Generator Tubing - An Easier Test Was Devised So Plants Could Meet Standards.
- The Deck Is Stacked In Relicensing To Ignore Increased Population Using A: **"Back-Fit Rule"**.
 - NRC Has Been Relaxing Standards Left and Right To Permit License Extensions For 71 US Reactors - NONE were rejected making It: **"Rubberstamp Permitting"**.

PLEASE DON'T USE THESE TACTICS AT LIMERICK NUCLEAR PLANT.

VALUE THE HEALTH, LIVES, AND ENVIRONMENT OF CURRENT AND FUTURE RESIDENTS.

DO AN HONEST REVIEW OF THE INHERENT DANGERS AND THREATS AT LIMERICK NUCLEAR PLANT.

SAY NO TO LIMERICK RELICENSING.

IT'S TOO RISKY TO OPERATE LIMERICK UNTIL 2029

**PLEASE DON'T EVER TRY TO TELL US WE ARE SAFE
BECAUSE LIMERICK HAS REDUNDANT SAFETY SYSTEMS.**

"Redundant Safety Systems" FAILED In Japan

**IMPROVED PRECAUTIONS
ARE URGENTLY NEEDED FOR LIMERICK**

**UNTIL LIMERICK CLOSSES IN 2029
NRC NEEDS TO REQUIRE:**

1. Extend Back-Up Power - To Last Days, Not Hours
2. Enforce SAFEST Fire Safety Regulations
3. Guard Against A 9/11 Plane or Missile Type Terrorist Attack
4. Extend Evacuation Zone To 50 Miles,
Not Just A10-Mile Evacuation Zone
5. SAY NO TO LIMERICK NUCLEAR PLANT:
 - UPRATES - Run Plant Harder
 - RELICENSING - Run Plant Longer

U.S. NRC Plant Inspection Findings Reported First Quarter 2011 for Limerick Unit 1

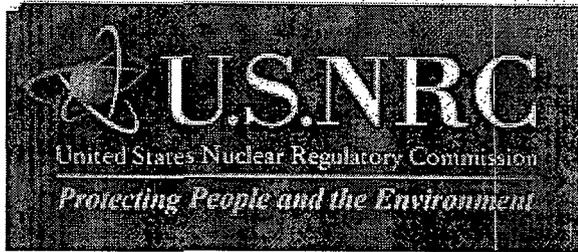
The attached report from the NRC identified five categories of findings for Limerick Unit 1, which occurred between September and December 2010:

- **Latching mechanism malfunction finding (September 2010)**
- **Multiple failures to revise the Updated Final Safety Analysis Report as required (December 2010)**
- **Unreliable unit coolers (3 of 4) due to various planned and unplanned conditions (December 2010)**
- **Failure to take compensatory action for an inoperable fire door (September 2010)**
- **Failure to perform adequate preventive maintenance on emergency diesel generators bypass valves (September 2010)**

The attached report from the NRC identified four categories of findings for Limerick Unit 2, which occurred between September and December 2010:

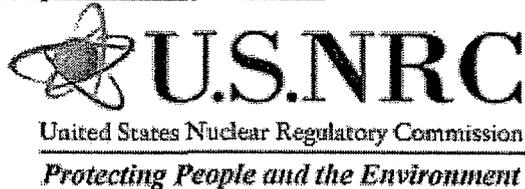
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ACE is concerned that this many findings, violations, and failures by Exelon in just one three month period in 2010 may indicate the ominous potential for increasingly frequent mechanical breakdowns in the future of aging and deteriorating equipment at Limerick.



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Limerick 1 1Q/2011 Plant Inspection Findings

Initiating Events

Significance:  Sep 30, 2010
Identified By: NRC
Item Type: FIN Finding

Failure to Identify Incorrectly Adjusted Control Power Relay Resulting in Unit 1 Manual Scram

A self-revealing Green finding was identified for the failure to identify that the latching mechanism on a bus 114A/124A control power auxiliary relay (27X) was incorrectly adjusted during prior post-maintenance testing activities. Specifically, proper post-maintenance testing activities in 1992 and 2004 should have identified that the latching mechanism was incorrectly adjusted. The incorrectly adjusted latching mechanism prevented the automatic swap of control power to the alternate source (bus 124A) when preferred power (bus 114A) was lost due to an electrical fault. This resulted in a loss of stator water cooling runback signal that would have caused the trip of both recirculation motor-generator sets and resulted in operators having to manually initiate a reactor scram. Exelon's corrective actions taken or planned included verifying the latching mechanism adjustment on the site's other similarly designed control power auxiliary relays, testing the automatic undervoltage transfer circuit on a periodic basis, and performing a failure analysis on the faulted underground supply cable which initiated the event.

The finding was more than minor because it was associated with the Equipment Performance attribute of the Initiating Events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The finding was determined to have very low safety significance (Green) in accordance with NRC IMC 0609, Attachment 4, Phase 1- Initial Screening and Characterization of Findings, because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigating equipment or function would not be available. Because the opportunities to identify the incorrectly adjusted latching relay occurred in 1992 and 2004, the inspectors determined that this finding was not reflective of current licensee performance, and, therefore, did not have a cross-cutting aspect. Enforcement action does not apply because the performance deficiency did not involve a violation of regulatory requirements

Inspection Report# : [2010004 \(pdf\)](#)

Mitigating Systems

Significance: SL-IV Dec 23, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Update the UFSAR Consistent with Plant Conditions as Required

The inspectors identified a Severity Level IV (SLIV) NCV of 10 CFR Part 50.71(e) in that Exelon failed on multiple occasions to revise the Updated Final Safety Analysis Report (UFSAR) with information consistent with plant conditions. Specifically, Exelon personnel failed to incorporate four previously identified UFSAR inconsistencies into the September 2010 UFSAR update as required.

The inspectors determined that the failure to update the UFSAR in accordance with 10 CFR 50.71(e) was a performance deficiency that was reasonably within Exelon's ability to foresee and correct, and should have been prevented. Because the issue had the potential to affect the NRC's ability to perform its regulatory function, the inspectors evaluated this performance deficiency in accordance with the traditional enforcement process. Using example 6.1.d.3 from the NRC Enforcement Policy, the inspectors determined that the violation was a SLIV (more than minor concern that resulted in no or relatively inappreciable potential safety or security consequence) violation, because the information that was not updated in the UFSAR was not used to make an unacceptable change in the facility nor did it impact a licensing or safety decision by the NRC.

In accordance with inspection manual chapter 0612, appendix B, this issue was not assigned a cross-cutting aspect.

Inspection Report# : [2010007 \(pdf\)](#)

Significance:  Dec 23, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Three of Four RHR Unit Coolers Unreliable due to Various Planned and Unplanned Conditions (Siltling).

The inspectors identified a violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," in that Exelon failed to correct a condition adverse to quality for a safety-related support system that was essential to successful mitigating system operation.

The inspectors determined that the failure to correct a condition adverse to quality in accordance with 10 CFR 50 Appendix B, Criterion XVI, during the timeframe of June 1, 2008 to September 14, 2008, contributed to the unreliability of the 1C-V210 unit cooler and was a performance deficiency. Specifically, Exelon did not initiate bi-weekly flushing per RT-6-011-603-0 of the 1C-V210 unit cooler to minimize the effects of silt build up. This finding is more than minor because it affected the equipment performance attribute of the Mitigating System cornerstone and the associated cornerstone objective of ensuring the reliability and availability of systems that respond to initiating events to prevent undesirable consequences. This issue was also similar to example 3.j. in NRC IMC 0612, Appendix E, "Examples of Minor Issues," in that it resulted in a condition where there was a reasonable doubt on the operability of the 1C-V210 unit cooler. The inspectors assessed this finding in accordance with IMC 0609, Attachment 4, Phase 1, "Initial Screening and Characterization of Findings," and determined that it was of very low safety significance (Green) since it was determined that the error did not result in a loss of the system's safety function.

The inspectors determined that this violation had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, in that Exelon did not take appropriate corrective actions to address a condition adverse to quality in a timely manner, commensurate with its safety significance and complexity. Specifically, Exelon failed to take appropriate actions to initiate bi-weekly flushes of the 1C-V210 unit cooler, upon discovery of conditions conducive to silt buildup during June through September 2008. [P.1 (d)]
Inspection Report# : [2010007 \(pdf\)](#)

Significance:  Sep 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Take Compensatory Action for Inoperable Fire Door

The inspectors identified a Green NCV of Limerick Generating Station operating License Condition 2.C.3, in that Exelon failed to take compensatory actions for an inoperable fire door. Specifically, on two occasions a required fire door was found in a condition where the latching mechanism did not function. Although issue reports (IRs) were written which identified this door to be a Technical Requirements Manual (TRM) fire door, actions were not taken to station the required hourly fire watch. Corrective actions included setting the required hourly fire watches, distributing guidance to all senior licensed operators, and implementing procedural changes to clarify the requirements of fire doors for future operability determinations.

The finding was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This issue was found to be of very low safety significance (Green) based upon a Phase 2 SDP screening. The inspectors determined that this finding did not have a cross-cutting because the incorrect operability decisions were based on a 1999 engineering evaluation and, therefore, was not reflective of current licensee performance.

Inspection Report# : [2010004 \(pdf\)](#)

Significance:  Sep 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Perform Adequate PM on EDGs

The inspectors identified a Green NCV of Limerick Unit 2 Technical Specification (TS) 6.8.1, **Procedures and Programs**, in that Exelon did not provide an adequate procedure for preventive maintenance (PM) of the Limerick Emergency Diesel Generator (EDG) lube oil (LO) filter bypass valves. As a result, Exelon did not identify that the EDG D23 LO filter bypass valves were degraded and allowed oil to bypass the filter during engine operation. This condition, combined with historical foreign material in the LO system, led to the failure of the EDG D23 number 5 upper piston assembly during a 24-hour endurance test run on May 5, 2010. Corrective actions implemented included repairing the damage to D23, performing a flush of the D23 LO system, revising the applicable PM procedure to include specific instructions for inspecting the LO filter bypass valves, and revising performance monitoring guidance to ensure spuriously lifting LO filter bypass valves would be identified in the future.

The finding was more than minor because it was associated with the Equipment Performance attribute of the Mitigating System cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was determined to be of very low safety significance (Green) in accordance with Inspection Manual Chapter (IMC) 0609, Appendix A, **Determining the Significance of Reactor Inspection Findings for At-Power Situations**, using SDP Phases 1, 2, and 3. This finding has a cross-cutting aspect in the area of Human Performance, Resources, because Exelon did not provide complete, accurate and up-to-date design documentation, procedures, and work packages [H.2(c)]. Specifically, Exelon did not provide site engineers with complete and accurate resources to ensure performance centered maintenance (PCM) template revisions were thoroughly reviewed and implemented.

Inspection Report# : [2010004 \(pdf\)](#)

Barrier Integrity

Emergency Preparedness

Occupational Radiation Safety

Public Radiation Safety

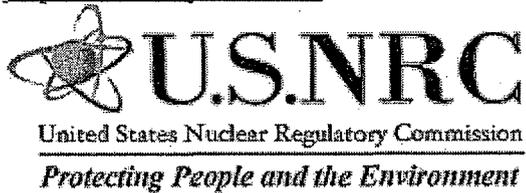
Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the cover letters to security inspection reports may be viewed.



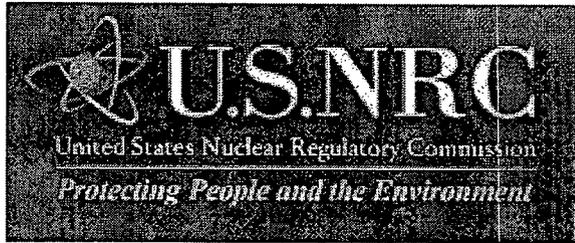
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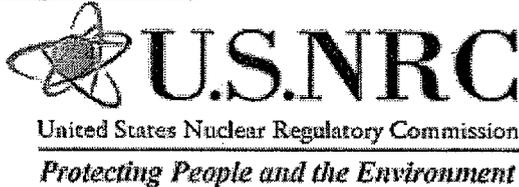


Limerick 1

1Q/2011 Plant Inspection Findings



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Limerick 2

1Q/2011 Plant Inspection Findings

Initiating Events

Mitigating Systems

Significance: SL-IV Dec 23, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Update the UFSAR Consistent with Plant Conditions as Required

The inspectors identified a Severity Level IV (SLIV) NCV of 10 CFR Part 50.71(e) in that Exelon failed on multiple occasions to revise the Updated Final Safety Analysis Report (UFSAR) with information consistent with plant conditions. Specifically, Exelon personnel failed to incorporate four previously identified UFSAR inconsistencies into the September 2010 UFSAR update as required.

The inspectors determined that the failure to update the UFSAR in accordance with 10 CFR 50.71(e) was a performance deficiency that was reasonably within Exelon's ability to foresee and correct, and should have been prevented. Because the issue had the potential to affect the NRC's ability to perform its regulatory function, the inspectors evaluated this performance deficiency in accordance with the traditional enforcement process. Using example 6.1.d.3 from the NRC Enforcement Policy, the inspectors determined that the violation was a SLIV (more than minor concern that resulted in no or relatively inappreciable potential safety or security consequence) violation, because the information that was not updated in the UFSAR was not

used to make an unacceptable change in the facility nor did it impact a licensing or safety decision by the NRC.

In accordance with inspection manual chapter 0612, appendix B, this issue was not assigned a cross-cutting aspect.

Inspection Report# : [2010007 \(pdf\)](#)

Significance: Dec 23, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Three of Four RHR Unit Coolers Unreliable due to Various Planned and Unplanned Conditions (Siltng).

The inspectors identified a violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," in that Exelon failed to correct a condition adverse to quality for a safetyrelated support system that was essential to successful mitigating system operation.

The inspectors determined that the failure to correct a condition adverse to quality in accordance with 10 CFR 50 Appendix B, Criterion XVI, during the timeframe of June 1, 2008 to September 14, 2008, contributed to the unreliability of the 1C-V210 unit cooler and was a performance deficiency. Specifically, Exelon did not initiate bi-weekly flushing per RT-6-011-603-0 of the 1C-V210 unit cooler to minimize the effects of silt build up. This finding is more than minor because it affected the equipment performance attribute of the Mitigating System cornerstone and the associated cornerstone objective of ensuring the reliability and availability of systems that respond to initiating events to prevent undesirable consequences. This issue was also similar to example 3.j. in NRC IMC 0612, Appendix E, "Examples of Minor Issues," in that it resulted in a condition where there was a reasonable doubt on the operability of the 1C-V210 unit cooler. The inspectors assessed this finding in accordance with IMC 0609, Attachment 4, Phase 1, "Initial Screening and Characterization of Findings," and determined that it was of very low safety significance (Green) since it was determined that the error did not result in a loss of the system's safety function.

The inspectors determined that this violation had a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, in that Exelon did not take appropriate corrective actions to address a condition adverse to quality in a timely manner, commensurate with its safety significance and complexity. Specifically, Exelon failed to take appropriate actions to initiate bi-weekly flushes of the 1C-V210 unit cooler, upon discovery of conditions conducive to silt buildup during June through September 2008. [P.1 (d)]

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The finding was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This issue was found to be of very low safety significance (Green) based upon a Phase 2 SDP screening. The inspectors determined that this finding did not have a cross-cutting because the incorrect operability decisions were based on a 1999 engineering evaluation and, therefore, was not reflective of current licensee performance.

Inspection Report# : [2010004 \(pdf\)](#)

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Failure to Perform Adequate PM on EDGs

The inspectors identified a Green NCV of Limerick Unit 2 Technical Specification (TS) 6.8.1, **Procedures and Programs**, in that Exelon did not provide an adequate procedure for preventive maintenance (PM) of the Limerick Emergency Diesel Generator (EDG) lube oil (LO) filter bypass valves. As a result, Exelon did not identify that the EDG D23 LO filter bypass valves were degraded and allowed oil to bypass the filter during engine operation. This condition, combined with historical foreign material in the LO system, led to the failure of the EDG D23 number 5 upper piston assembly during a 24-hour endurance test run on May 5, 2010. Corrective actions implemented included repairing the damage to D23, performing a flush of the D23 LO system, revising the applicable PM procedure to include specific instructions for inspecting the LO filter bypass valves, and revising performance monitoring guidance to ensure spuriously lifting LO filter bypass valves would be identified in the future.

The finding was more than minor because it was associated with the Equipment Performance attribute of the Mitigating System cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was determined to be of very low safety significance (Green) in accordance with Inspection Manual Chapter (IMC) 0609, Appendix A,

Determining the Significance of Reactor Inspection Findings for At-Power Situations, using SDP Phases 1, 2, and 3. This finding has a cross-cutting aspect in the area of Human Performance, Resources, because Exelon did not provide complete, accurate and up-to-date design documentation, procedures, and work packages [H.2(c)]. Specifically, Exelon did not provide site engineers with complete and accurate resources to ensure performance centered maintenance (PCM) template revisions were thoroughly reviewed and implemented.

Inspection Report# : [2010004 \(pdf\)](#)

Barrier Integrity

Emergency Preparedness

Occupational Radiation Safety

Public Radiation Safety

Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the cover letters to security inspection reports may be viewed.

Miscellaneous

Last modified : May 04, 2011

Flaw Found in Safety Mechanism at Limerick Nuke Plant

Wednesday, October 5, 2011 By Evan Brandt, ebrandt@pottsmmerc.com

LIMERICK — Even before an earthquake and tsunami refocused the world's attention on the dangers inherent in nuclear power, the manufacturer of a key safety mechanism at many nuclear power plants, including Limerick Generating Station, was warning it might not work during an earthquake.

GE Hitachi first issued the warning to the Nuclear Regulatory Commission in September 2010 and confirmed the concern again last month.

The concern refers to the "control rods" for boiling water reactor models, the type of reactor at Exelon Nuclear's plant along the Schuylkill River. The control rods are inserted into the reactor between the rods of nuclear fuel in order to shut it down quickly, a procedure called "a scram," and are meant to be used in an emergency and more slowly during scheduled downtime. The control rods work by absorbing neutrons, shutting down the nuclear fission reaction that creates the heat that boils the water and drives the turbine to create electricity.

But engineering evaluations by GE Hitachi showed the design for the mechanism that inserts the control rods "do not address the potential impact of a seismic event on the ability to scram," according to its first Sept. 3, 2010, notice.

The problem, NRC spokesman Neil Sheehan said, is friction in the assembly that moves the control rods into position might be made worse by an earthquake.

On Sept. 26, GE Hitachi informed NRC it had "determined that the scram capability of the control rod drive mechanism" in reactors like those at Limerick and Peach Bottom Atomic Generating Station on the Susquehanna "may not be sufficient to ensure the control rod will fully insert."

The problem only occurs, according to GE's analysis, "when the reactor is below normal operating pressure" and an earthquake hits.

"In this scenario, a substantial safety hazard results because the affected control rods might not fully insert to perform the required safety function," the company told NRC.

"There need to be three conditions present for this kind of scenario to happen," Sheehan explained in an email.

"1) The control rods (or at least some of them) already have to be 'sticky,' or for some friction to already be present. That can occur when fuel gets older and bowing of fuel rods sometimes takes place," Sheehan wrote.

"2) The reactor is operating at low pressure. The control rod mechanisms (the pistons that force boiling water reactor control rods in from the bottom of the vessel) use pressure from the reactor vessel to inject the rods. There is less forcing pressure when the reactor is running at low pressure," wrote Sheehan.

"3) A severe earthquake," he concluded.

While there may have been a time when the chances of such a string of events happening at once might have been dismissed as too unlikely, the earthquake and subsequent tsunami in Japan in March, and the earthquake in Virginia in August have given such "what-if" scenarios added credence.

More significantly, Sheehan confirmed that some of the reactors at the Fukushima plant affected by the Japanese earthquake are boiling water reactors, similar to those at Limerick.

He wrote that "the loss of power at Fukushima knocked out safety systems. That was the major contributor to the accident. Details of exactly what happened, including the insertion of control rods or lack thereof, are still being determined."

He also confirmed that the 5.8 magnitude earthquake centered in Louisa County, Va., that struck on Aug. 23 and was felt as far north as New York City was beyond what the nearby North Anna Nuclear Plant had been designed to withstand. The reactors at that plant are of a type known as pressurized water reactors and so were not subject to the concerns highlighted by GE Hitachi.

Nevertheless, reactors at that plant in Virginia remain shut down while the owners, Dominion Power, and the NRC determine whether the plant sustained any damage. NRC announced last week more inspections would need to be conducted before a decision is made about starting North Anna's reactors up again.

The North Anna plant is among 27 that a preliminary NRC review recently found may need upgrades to protect against earthquake risk. That list also includes the Limerick Generating Station's two reactors.

Joe Szafran a spokesman for Exelon Nuclear's Limerick Generating Station did not respond to requests for comment.

Sheehan said the NRC does not believe the potential problem is cause for extreme concern.

"The plants have procedures for dealing with stuck control rods. They also have procedures for dealing with rods that only insert partially," Sheehan wrote in an email.

"Plant operators can also inject boron to halt fissioning. Based on these capabilities, we believe the plants remain safe to operate as work on this issue continues," Sheehan wrote.

"While GE Hitachi will be working with each potentially affected plant on remedies, it is also developing a long-term solution that involves a redesign that would result in fewer tolerances, i.e., less friction, between the control rods and the nuclear fuel," Sheehan wrote.

In the meantime, GE Hitachi has recommended plants monitor the equipment for any problems.

The NRC began re-examining the issues related to earthquakes as early as 2003 and continued in the wake of new analysis of seismic risks in the eastern half of the U.S. by the U.S. Geological Survey.

On Sept. 19, according to the Associated Press, the NRC issued a new report urging the agency to “immediately require operators to re-evaluate whether U.S. nuclear plants can withstand earthquakes and floods.”

The report identifies “seven steps the NRC should take ‘without delay’” including “immediate reviews of seismic and flooding risks at the nation’s 104 reactors.”

Sheehan wrote that although the matter of the control rods is “a separate and distinct issue,” that “seismic vulnerabilities will clearly be among the key areas to be reviewed as part of our post-Fukushima reviews.”

Last month, the Associated Press published a report analyzing NRC data and concluding that “the risk an earthquake would cause a severe accident at a U.S. nuclear plant is greater than previously thought — 24 times as high in one case.”

The AP analysis mirrored one done by **MSNBC.com** in March that also used NRC data to determine that the risk of earthquake damage was greater than once thought by the federal agency. The **MSNBC.com** report ranked Limerick as the plant with the third highest risk of being damaged by an earthquake.

The risk of an earthquake damaging either or both reactors at Limerick was increased by 141 percent under the **MSNBC.com** analysis. That analysis found the chance of an earthquake damaging the plant was raised in the study to 1 in 18,868. The previous risk rating was 1 in 45,455.

The NRC disavowed both the **MSNBC.com** and AP analysis, saying NRC data had been used in a way that is inconsistent with how the agency measures risk.

You can follow Evan Brandt on Twitter @PottstownNews

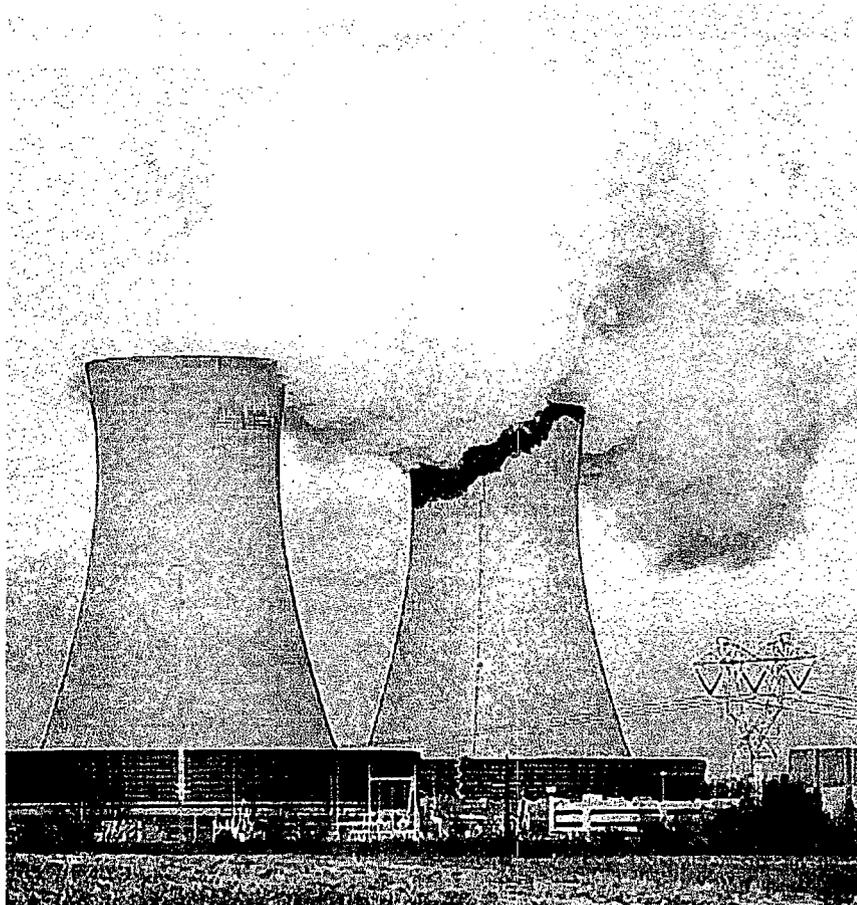
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NRC Inspection Raises New Issues At Limerick plant (Video)

Published: Sunday, June 05, 2011; Last Updated: Sun. Jun 5, 2011, 12:



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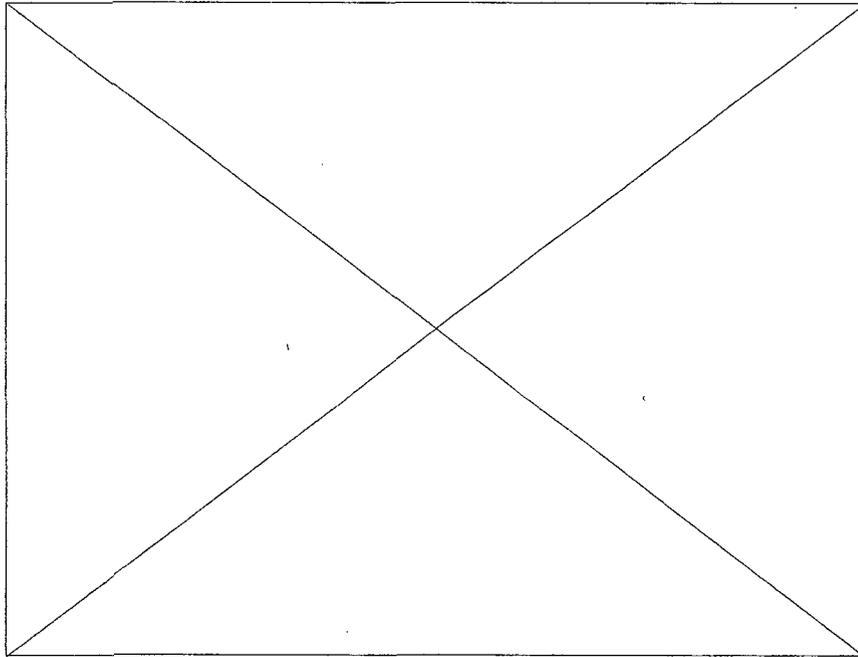
LIMERICK — Some parts of Exelon Nuclear’s Limerick Generating Station might not be reliable to prevent damage from flood or fire if the plant was struck with an earthquake, a government inspection has found.

The inspections were meant to look at issues arising from extraordinary events, similar to those that occurred at Japan’s Fukushima Daiichi plant as the result of the March 11 earthquake and tsunami.

However, an NRC spokesman confirmed some of the elements called into question by the site inspectors “could adversely impact the plant’s fire and flood mitigation capabilities,” even if the emergency were within the bounds of a disaster the plant was designed to withstand.

The NRC has taken an increased interest in how plants would handle extreme emergencies like those in Japan, now considered at least as bad as the Chernobyl accident in 1986.

During the NRC's annual community briefing on the plant's operation on May 18, Branch Chief Paul Krohn referred to Japan repeatedly and talked about what lessons the NRC is attempting to draw from events there.



The NRC recently initiated a series of preliminary inspections at all 104 of the nation's nuclear plants, including Limerick.

Out of 65 operating reactor sites, 12 had issues with one or more of the emergency response requirements during the inspections, the NRC reported May 20.

"Our resident inspectors did a good job of spotting problems, as well as helping the plants identify areas for improvement," NRC Chairman Gregory Jaczko said in a news release on the subject.

Nine sites had issues regarding emergency strategies; three had issues with their strategies for dealing with a black-out, and two had issues with dealing with extreme flooding events.

Nevertheless, "none of these issues undermine the plants' abilities to respond to extreme events," the release stated.

That was the conclusion two resident inspectors at the Limerick plant reached in late April about the plant's ability to deal with fire and flooding

"The inspectors concluded that the licensee meets the current licensing and design bases for fire protection and flooding," the report concludes.

This conclusion was reached despite findings that “many of the (systems, structures and components) relied upon to mitigate flood and fire events at Limerick are not designed to meet seismic qualification standards. Therefore, a design basis seismic event at the site could adversely impact the plant’s fire and flood mitigation capabilities,” inspection report documents stated.

In an e-mail to The Mercury, NRC spokesman Neil Sheehan wrote that the issues raised in the inspection report “involve potential seismic vulnerabilities that are within the plant’s ‘design basis.’”

Sheehan wrote, “each plant is built to withstand certain events, i.e., the worst historical earthquake for the area, with margin added on top of that. That would be the plant’s ‘Design Basis.’”

He added, “I would note that there is a difference between ‘seismically qualified’ and capable of withstanding an earthquake. Further analysis might determine these systems, structures and components would still be capable of performing their functions.”

“An issue that is ‘Beyond Design Basis’ would be an extreme event, such as severe flooding combined with a significant earthquake,” Sheehan wrote.

Problems were found among some system in that category as well.

According to the report — which can be read in full [by clicking here](#) — the inspectors further found some (systems, structures and components) “could not be relied upon to fulfill their flood mitigation function following a design basis earthquake.”

Some examples cited by the inspectors include:

- “Many of the turbine buildings walls are credited for external and internal flood scenarios. Although analysis has shown that the turbine building will not collapse due to a safe shutdown earthquake, it is not known what impact a seismic event would have on its flood mitigating capabilities.”
- “Limerick’s flood and fire penetration seals are not specifically designed or tested to be seismic.”

It should be noted that “the above-stated vulnerabilities are considered beyond-design-basis,” the inspectors wrote.

Sheehan indicated it is too early to draw long-term conclusions from the inspection report.

“This inspection was our first cut at each site for possible implications of the Japanese reactor events. Further evaluation will be needed,” Sheehan wrote.

The NRC is also looking at how well U.S. nuclear plants would be able to respond to events that are “beyond design basis,” wrote Sheehan.

While the disasters that struck Japan, an earthquake followed by a tsunami, might seem extreme. The plant there was built anticipating their possibility, just not at the strength at which they struck.

Although the risk of severe earthquake at the Limerick site is extremely low, a U.S. Geologic Survey study completed two years ago provided data that shows it's not as low as once thought.

One analysis used the USGS data, and an NRC review that followed it, to conclude the risk of earthquake damage at Limerick is 141 percent more likely than previously thought.

The U.S. Geologic Survey's 2008 updating of earthquake risks around the country, used better data and more sophisticated measurements and modeling than were used in the 1996 and 2002 efforts.

The new geological information led NRC in 2010 to re-examine earthquake risks for nuclear plants east of the Mississippi.

An investigation by MSNBC.com, published online March 17, added NRC's new earthquake risk analysis to existing NRC data for western plants, where earthquakes are more prevalent, and created an earthquake damage risk ranking for the nation's 104 nuclear plants.

MSNBC.com concluded that because most eastern plants were built assuming a low risk of earthquake, unlike their more robustly constructed western cousins, that the Limerick plant is the nation's third most at risk of damage from earthquake.

The NRC analysis found the chance of an earthquake damaging the plant was raised in the study to 1 in 18,868.

The previous risk rating was 1 in 45,455.

For comparison purposes, the MSNBC.com article noted the chance of winning the grand prize in the Powerball lottery in March was 1 in 195,249,054.

The analysis also reveals that of the top 10 nuclear plants most at risk from earthquake damage, three are in Pennsylvania, more than any other state.

The other two are the Shippingport Atomic Power Station in Beaver County and the Three Mile Island plant in Dauphin County.

In fact, just over a week ago, a very minor earthquake struck the Philadelphia area according to an Associated Press report.

USGS geophysicist John Bellini told AP the May 27 earthquake was centered near Cornwells

Heights and Eddington, just northeast of Philadelphia and west-northwest of Beverly, N.J.

Bellini says the magnitude-1.7 quake was so small it was unable to do any damage. He said to residents it might have sounded like "a big truck going by."

Philadelphia police and firefighters told AP some residents felt their houses shake.

While the risk of catastrophic earthquake combined with another major disaster, such as a flood, remains relatively remote, Japan's experience has convinced NRC it is worth re-examining the current U.S. situation to assess risk.

During the May 18 annual meeting in Limerick, Krohn said the biggest advances in nuclear safety have come as a result of what is learned in the wake of the biggest disasters, such as Chernobyl and Three-Mile Island. *BASIC-END THINKING*

Sheehan wrote, "we would say this about this initial phase of our Japan-related reviews:

- The results of the inspections indicate general compliance with the regulations though some potential findings have been noted.
- The inspections assess U.S. nuclear plants' capabilities to respond to extraordinary plant challenges.
- The inspections assessed some capabilities that are not current regulatory requirements (that is, they are beyond the 'design basis' for the plant, or the phenomena it was designed to withstand)."

The inspection report also shows the site inspectors checked all emergency back-up generators, batteries and related equipment and reported them adequate to respond to a loss of power at the plant. *near Tong*

That emergency response also includes agreements with off-site fire companies that they have ladder trucks and pumps that can be used to spray water into a spent fuel pool, according to the report. There was some concern listed by the inspectors about whether adequate power would be available for four hours under certain disaster scenarios but, while under review, these concerns were not determined to "significantly impact Limerick's response."

Sheehan wrote that the information from the inspections, as well as a request for information on how nuclear plants plan to deal with the potential loss of large areas of the plant after extreme events, will all be examined by the NRC.

Assessment of that information "will be used to determine future regulatory actions," Sheehan wrote.

The NRC Task Force "(overseeing the agency's Japan-related reviews) will continue to review and evaluate to determine if future actions are required," he wrote.

LIMERICK

6/4/11

Nuke plant reports 3rd shutdown this week

By Evan Brandt,
ebrandt@pottsmmerc.com

LIMERICK — Less than a day after putting one of its two nuclear reactors back on line following two unplanned shutdowns, the other nuclear reactor at Exelon's Limerick Nuclear Generating Station shut down unexpectedly Friday, according to the Nuclear Regulatory Commission.

"Limerick Unit 1 experienced an automatic scram at about 10:15 a.m. today. There were no complications during the shutdown, safety systems responded as expected, and the cool-down of the reactor is proceeding safely," according to an e-mail from NRC spokesman Neil Sheehan.

"The cause of the scram is being investigated by Exelon," Sheehan wrote. "Plant operators were performing a test involving the turbine at the time, but it is unclear at this point if

(See LIMERICK on A5)

COMING SUNDAY: Post-Japan checkup raises new issues

Nuke plant reports 3rd shutdown this week

(LIMERICK from A1)

that triggered the shutdown."

It was 5:02 a.m. Sunday that the plant's other reactor, Unit 2, shut down for the first time.

One day later, while completing testing on the system that controls the opening and closing of turbine valves, the turbine tripped offline again, at 11:50 a.m. Monday.

In February, the same reactor, Unit 2, shut down unexpectedly due to problems with systems related to recirculating pumps. That shutdown lasted for more than two days.

Unit 2 went back on line Thursday.

Sheehan wrote Friday morning, "our Senior Resident Inspector went to the plant's control room immediately after the scram and is independently verifying whether plant operators are

following the appropriate steps and procedures. He will continue to gather information on what occurred and the company's response to it."

Limerick Unit 1 was at 100-percent power when it shut down.

The NRC tracks scrams based on the number of times they happen per 7,000 hours of on-line operation.

"The shutdown would count as a hit on Limerick Unit 1's Performance Indicator for Unplanned Scrams per 7,000 Hours of Online Operation. As of the end of the first quarter of 2011, that indicator stood at 0.8," Sheehan wrote.

"Again, a plant has to have more than three unplanned scrams during that 7,000-hour period to receive increased NRC oversight," Sheehan wrote.

A public community information session is planned Wednesday at the power plant from 5 to 7 p.m.

● Low Coolant Level Can Lead To Disaster

April 2007 - Low Coolant Caused Limerick Shut Down



75th.
Anniversary.

Wednesday, April 25, 2007

www.pottsmere.com

The Mercury

Pottstown, Pennsylvania

April 24, 2007

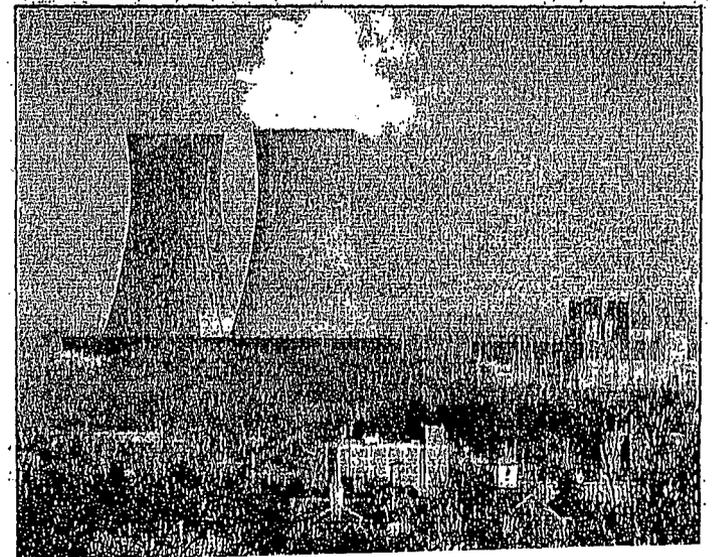
Coolant Level Causes Power Plant Generation To Shut Down

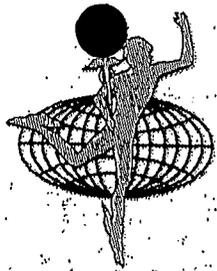
Low Coolant Level Was Detected In Unit 2

15 days later - NO explanation

The incident was still under investigation

April 9, 2007 - 5 days after refueling there was a problem with a seal on the pump.





The Mercury

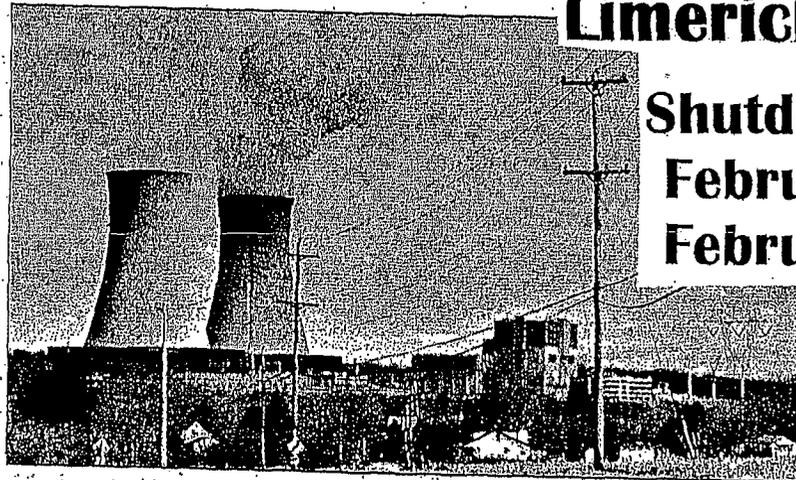
Tuesday, February 12, 2008

PottsMerc.com

Pottstown, Pennsylvania

Nuclear reactor shutdown is second in 10 days

By Evan Brandt
ebrandt@pottsmmerc.com



A generator at the Limerick Nuclear Generating Station was shut down on Saturday for the third time since Feb. 1.

Daniel P. Creighton/The Mercury

Limerick Nuclear Plant

Shutdowns Reported
February 2, 2008
February 12, 2008

By Evan Brandt
ebrandt@pottsmmerc.com

Limerick generator shut down again

3rd Unplanned Shutdown In 2 Months

Reported March 25, 2008

**Repeated Problems In 2008 Support
NO Relicensing In 2029**



The Mercury

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Tuesday, March 25, 2008

For Home Delivery, call 610-970-4500

Pottstown, Pennsylvania

Limerick generator shut down again

By Evan Brandt
ebrandt@pottsmmerc.com

LIMERICK — Twenty-six and a half hours after bringing one of its nuclear generators up to full power following a 9-day refueling outage, it was shut down again at 7:39 p.m. Saturday.

The shutdown was the third unplanned shutdown since Feb. 1 and the fourth since last April, according to information from the Nuclear Regulatory Commission.

The seven-sentence press release issued by Exelon Nuclear, which owns and

operates the Limerick facility, said “the shutdown occurred due to a problem identified with the main turbine control system on the electrical distribution side of the plant. Limerick operators are making repairs to the system.”

NRC spokesman Neil Sheehan said early Monday afternoon that Exelon “is still trouble-shooting. And we’re still trying to learn more about it.”

He said the latest repair was the replacement of “circuit cards” involved with the control system on the turbine.

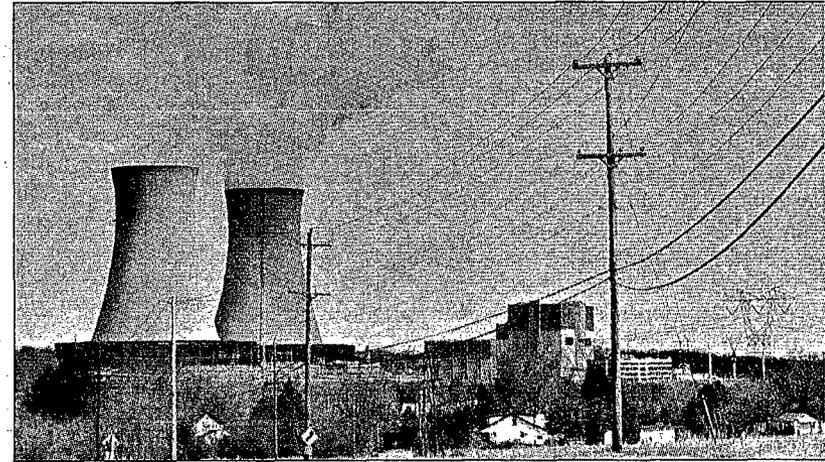
“We still don’t have a firm reason” for the shutdown, Sheehan said. “It could

have been a faulty circuit card.”

The shutdown occurred automatically on Unit 1, on which refueling had been completed and had only been ramped up to full power for a day.

Typically, much of the annual maintenance on the generator is done during the refueling while the reactor is shut down, but Exelon “did not work on that electrical system during the outage, other than some calibration work,” Sheehan said of the system being looked at as the possible cause.

(See LIMERICK SHUTDOWN on A3)

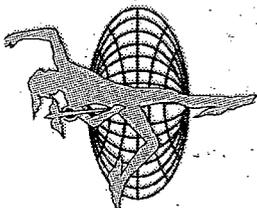


Daniel P. Creighton/The Mercury

A generator at the Limerick Nuclear Generating Station was shut down on Saturday for the third time since Feb. 1.

The Mercury

PottsMerc.com



Tuesday, February 12, 2008

Nuclear reactor shutdown is second in 10 days

By Evan Brandt
ebrandt@pottsmmerc.com

LIMERICK — The second unplanned shutdown in 10 days of a nuclear reactor, which occurred Sunday at the Exelon Nuclear's Limerick Generating Station, is unrelated to a Feb. 1 incident that also caused the reactor to be shut down, according to the Nuclear Regulatory Commission.

On Sunday afternoon, officials at the plant shut down the unit 2 reactor after a leak was discovered in a recirculation pump there, said Neil Sheehan, an NRC spokesman.

Unit 2 was the same unit that shut down on Feb. 1 due to a faulty connection to an electrical transformer, according to a release provided Saturday by David Petersen, communications manager at the Limerick plant.

By 6:35 p.m. Saturday, unit 2 was up to 87 percent capacity in the wake of the transformer repair when the system alerted operators to a leak in a seal on one of the reactor's recirculation pumps, said Sheehan.

An e-mail from Petersen described the leak as "a recirculation pump that was not performing to Exelon Nuclear's high equipment standards."

(See UNIT 2 SHUTDOWN on A3)

Limerick nuclear reactor shut down for second time in 10 days

(UNIT 2 SHUTDOWN from A1)

By Sunday morning, plant power was reduced to less than 40 percent after the plant took the loop to which the recirculation pump was attached out of service so it could be repaired.

By 4 p.m. Sunday, unit 2 was "scrammed" or shut down, Sheehan wrote.

Sheehan said he could not say how long unit 2 would be off-line, but said "it's probably more on the order of a short-term" outage.

Unit 1 remains on-line and running at full capacity, according to Petersen.

NRC's on-site inspectors were on-hand throughout the Feb. 9 incident and determined that the plant operators "handled the leakage and the shutdown appropriately," Sheehan wrote in an e-mail.

He said the water that leaked out of the

pump seal is "only very slightly" radioactive and was captured inside the plant.

The two shutdowns fall into two different categories by which the NRC measures performance at nuclear plants, Sheehan explained.

He said the Feb. 1 incident will be categorized as an "unplanned scram." He said two more of those within six months would put the plant into a category that requires a higher level of NRC oversight.

The Feb. 9 incident falls into a category called "unplanned power changes," and it would take six or more such incidents in the next six months to push the plant to a higher NRC oversight level.

The two incidents are unrelated, and are "the kinds of issues we see at other plants," Sheehan said.

"Pump seals fail occasionally," said Sheehan. "It's not outside the normal range of things."

Electrical problem causes Limerick Unit 2 to automatically shut down Friday

2-2-08

By Michelle Karas

mkaras@pottsmmerc.com

LIMERICK — One of the two reactors at Exelon Nuclear's Limerick Generating Station automatically shut down early Friday morning as a result of an "electrical problem on the non-nuclear side of the plant," facility officials said.

"We're still in a full investigation to determine the root cause," said David Peterson, spokesman for the plant.

Limerick's Unit 2 turbine shut down automatically at 4:45 a.m. Friday, followed by the reactor shutdown in response to "an indicator that there was a fault on the electrical distribution side of the plant," Peterson said. Unit 1, howev-

er, continues to operate at full capacity.

The units are designed to shutdown automatically as a safety precaution in the event of any operational discrepancies.

Peterson said there was no risk to the public or the plant's 700 employees, and no injuries were associated with the shutdown.

As of midday Friday, plant officials were uncertain when Unit 2 — which is the tower on the right as you look eastward from Pottstown — will be operational again, he said.

"The key is that everything responded in the safe manner that it's supposed to," Peterson said. "And the investigation into what cause it is under way."

Limerick cooling tower shuts itself down

7-20-05
By Mike Castiglione

mcastiglione@pottsmmerc.com

LIMERICK — Peering out at the cooling towers of Exelon's Limerick Generating Station, observers may notice that since Monday morning steam has only been pouring out of one of the units.

At about 10 a.m. Monday, Unit 1 underwent an unexpected automatic shutdown because of a trip in the electrical distribution area of the plant, officials said.

"We have had automatic shutdowns in the past, but our record of operation continues to be one of the best in the industry," said Beth Rapczynski, spokeswoman for the plant.

Although Unit 2 is running at full power, Unit 1 continued to be shut down Tuesday. Officials did not release a time period for when Unit 1 would be up and running, a policy plant officials uphold when dealing with "proprietary information." However, Tuesday

evening, officials did confirm that Unit 1 was starting back up, a process that takes considerably longer than the time it takes to shut down.

According to Rapczynski, there is nothing for area residents to worry about with respect to the cooling tower being shut down. "There was no release of radiation, nor were there any injuries to any employees during the process," Rapczynski said. "Unit 1 was shut down properly and safely. There are no issues, everything went as expected."

Rapczynski said the plant is set up to shut down in cases where there is a trip. The shutdown happens within seconds of initiation.

In April, the plant received high marks from the Nuclear Regulatory Commission during its annual performance assessment, meaning there were very few safety issues.

Plant officials did confirm that the NRC was notified Monday of what was going on.

Rapczynski, when asked if Monday's shut down, or the subsequent response to the situation, would have any effect on the NRC's evaluation, replied, "The NRC will look into it. They look at many different aspects when they conduct the assessments. It's up to them how they handle it."

The Mercury was unsuccessful in attempts to reach the NRC for comment.

This is the second time in recent months that one of the towers had to be unexpectedly shut down. In March, after a scheduled refueling outage to conduct maintenance to Unit 2, the tower had to be shut back down two days after it came back online due to a high temperature reading on a turbine bearing.

Crews investigated and found damage to the bearing. Workers repaired the damage and the plant was functioning normally seven days after it shutdown.

**SOME REPORTED
INCIDENTS**

AT

**LIMERICK
NUCLEAR
POWER PLANT**

Greenpeace Report Reveals Potential For An "American Chernobyl"

According To NRC Documentation,
NEARLY TWO HUNDRED "NEAR MISSES" OCCURRED
AT U.S. NUCLEAR PLANTS SINCE 1986

- **Limerick Nuclear Power Plant Had TWO**
 - 1. Unit 1 in 1995**
 - 2. Unit 2 in 2001**

- **Further, LIMERICK is one of the plants in which the CONTAINMENT IS SUBSTANDARD, meaning that if an accident occurred, much more radioactivity would be released.**

Greenpeace report (67 pp.) address below, documents 200 "near misses" that almost became major accidents at U.S. nuclear plants since 1986.

Washington – Two days prior to the 20th anniversary of the Chernobyl disaster, Greenpeace released the first analysis of the dangers posed by nuclear reactors in the United States in a report entitled *An American Chernobyl: Nuclear "Near Misses" at U.S. Reactors Since 1986*. The report, based on Nuclear Regulatory Commission (NRC) records, reveals that nearly two hundred "near misses" to nuclear meltdowns have occurred in the United States.

The report release also features interactive mapping using GoogleEarth that provides high resolution satellite photographs identifying the 10-mile risk zone for each reactor, census data of those living within the risk zone, and incident statistics for each reactor.

"This report shows that nuclear power plants are a clear and present danger and that each reactor is a potential Chernobyl," said Jim Riccio, Greenpeace nuclear policy analyst.

Over the past several years, the nuclear industry has begun calling for a "nuclear renaissance" to address the urgent issue of global warming.

"To call nuclear reactors clean and safe is the height of hypocrisy," said Jim Riccio. "Unfortunately, nuclear energy will not address our addiction to oil and therefore, it isn't a viable solution to global warming," said Riccio.

Executive Summary:

<http://www.greenpeace.org/usa/assets/binaries/an-american-chernobyl-executi>

Full Report:

<http://www.greenpeace.org/raw/content/usa/press/reports/an-american-chernobyl-nuclear.pdf>

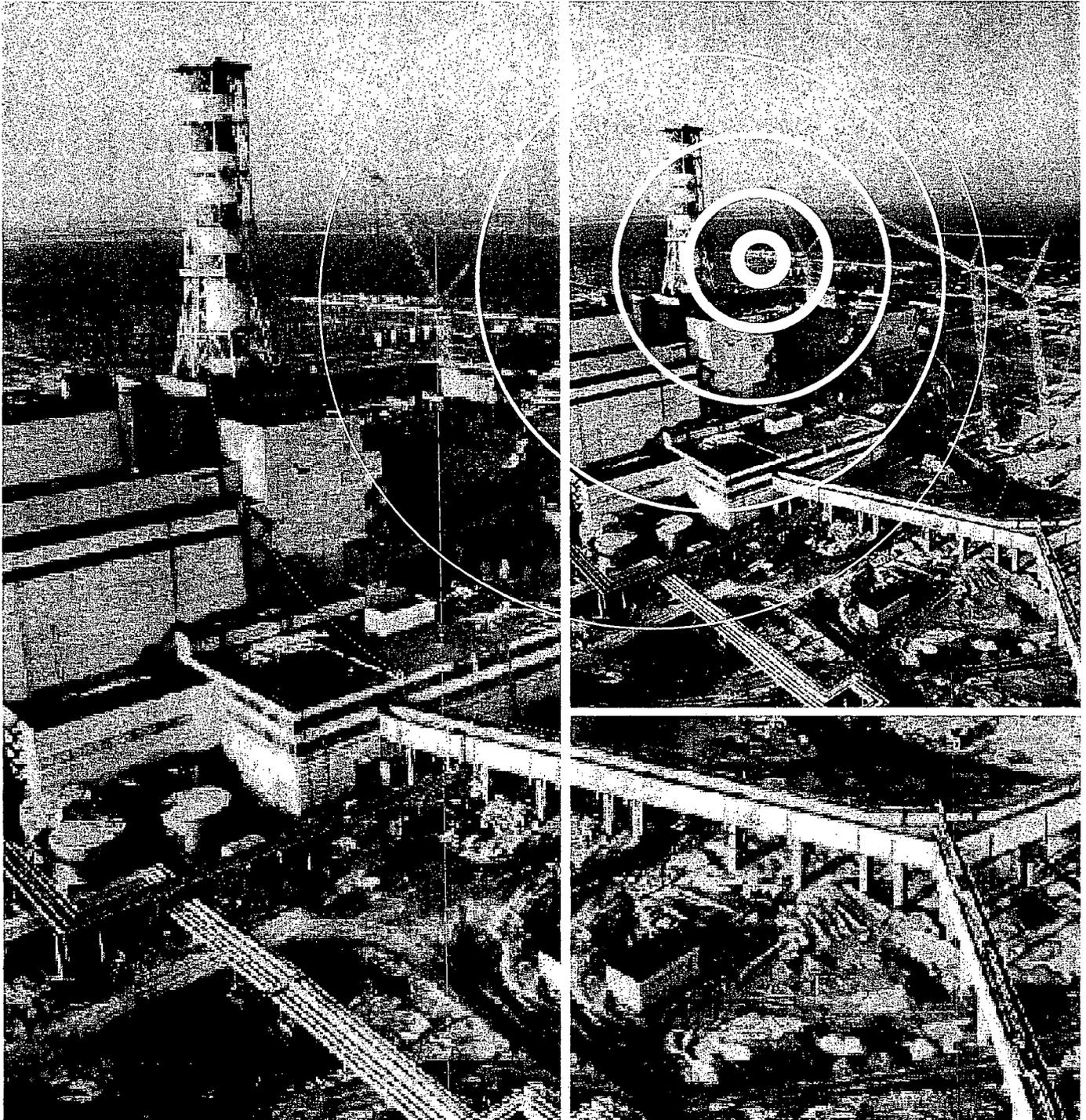
State-Based Interactive mapping is available at:

<http://www.greenpeace.org/usa/assets/binaries/americanchernobylmaps.kmz>

Contact: Jane Kochersperger, Media Officer, (202) 319-2493; (202) 415-5477
cell; Jim Riccio, Nuclear Policy Analyst, (202) 319-2487

Attached Pages Selected To Explain and Show Incidents At Limerick Nuclear Power Plant

AN AMERICAN CHERNOBYL: Nuclear "Near Misses" at U.S. Reactors Since 1986



Photograph Source: U.S. Department of Energy
Copyright 2006 by Greenpeace

The public has been misled and the nuclear propagandists both in industry and government are at it again. However, this time the pro-nuclear spin is due to the fact that the nuclear industry is attempting to build new reactors for the first time in over a generation. Once again the nuclear industry and its allies in government are claiming that a Chernobyl accident can not happen here.

Greenpeace begs to differ:

- + U.S. reactors can have accidents with consequences equal to or greater than the Chernobyl disaster.
- + U.S. reactors have and will continue to experience "near misses" that could result in a meltdown.
- + U.S. reactor containments were not designed to withstand a reactor meltdown and the government has little confidence that any of them could.

Below, Greenpeace documents the nuclear "near misses" at U.S. reactors since the Chernobyl disaster.

+ Nuclear "Near Misses" Terminology

In order to compile the nuclear near misses since Chernobyl, Greenpeace reviewed the U.S. Nuclear Regulatory Commission's program for tracking and evaluating near misses or as the agency terms them "precursors to severe core damage accidents" or "accident precursors." Accident precursors are those actual events or conditions at nuclear reactors that if additional failures had occurred, would have resulted in inadequate cooling of the radioactive fuel and could have caused severe core damage; i.e., a meltdown.¹⁹

The U.S. Nuclear Regulatory Commission analyses event reports submitted by the nuclear corporations to capture those events or conditions that could have led to a meltdown. The NRC has been tracking accident precursors since 1979. For the purpose of analyzing risk, the NRC breaks nuclear reactor events into two categories: Initiating Events and Degraded Conditions.²⁰

Initiating Events are actual occurrences such as a loss of offsite power (LOOP) or an automatic or manual shutdown (SCRAM) of the reactor with complications like any additional equipment failures or degradation of safety system function.²¹

Degraded Conditions are those recognized safety system or equipment degradations or unavailability that came to light without an occurrence of an initiating event.²²

To analyze Initiating Events, the NRC calculates a conditional core damage probability or CCDP. CCDP represents the probability that the nuclear reactor would experience core damage or a meltdown of the radioactive fuel rods, given an occurrence of the initiating event and any subsequent equipment failure or degradation.²³

To analyze Degraded Conditions, the NRC calculates the increase in core damage probability or CDP. CDP represents the increase in the probability that the reactor would damage the core for the period that safety equipment was unavailable or incapable or performing its function. However, the NRC's risk models do not account for the unavailability of equipment greater than a year.²⁴

+ Nuclear "Near Misses" since Chernobyl 20

+ Nuclear "Near Misses" since Chernobyl

The U.S. Nuclear Regulatory Commission has analyzed hundreds of events since the Chernobyl disaster that could have led to a meltdown. Of those events, the NRC has identified nearly 200 as precursors to severe core damage accidents. According to the NRC, most events can be directly or indirectly associated with four initiators:

1. a reactor trip (which includes loss of main feed water);
2. a Loss of Off Site Power or LOOP;
3. a Small Break Loss of Coolant Accident or LOCA, and
4. Steam Generator Tube Ruptures.³⁶

Despite NRC claims to the contrary an "American Chernobyl" is possible. If any of these "near misses" had progressed to a meltdown the government has little confidence that any of the reactor containments could withstand the accident.³⁷

A reactor meltdown and the subsequent failure of the reactor containment is an "American Chernobyl."

3/7/1994	Zion Unit 2	Aux Feed Water & Emergency Diesel Inoperable	2.30E-05
7/15/1998	DC Cook 1	Potential High-Energy Line Break Affecting Safety Systems	2.20E-05
7/15/1998	DC Cook 2	Potential High-Energy Line Break Affecting Safety Systems	2.20E-05
3/5/2001	Seabrook	Reactor Trip With Complication	2.10E-05
1/4/2004	Calvert Cliff 2	Reactor Trip With Complication	2.00E-05
8/14/2003	Nine Mile Point 2	Loss Of Offsite Power Due To Northeast Blackout	2.00E-05
8/14/2003	Nine Mile Point 1	Loss Of Offsite Power Due To Northeast Blackout	2.00E-05
8/14/2003	Fermi 2	Loss Of Offsite Power Due To Northeast Blackout	2.00E-05
4/20/1995	Arkansas Nuclear 1	Reactor Trip With Emergency Feed Water Unavailable	2.00E-05
9/8/1994	River Bend	Reactor Scrams & Control Rod Drive Systems Unavailable	1.80E-05
5/23/1996	Bryron	Loss Of Offsite Power	1.70E-05
3/27/1992	Crystal River	Loss Of Offsite Power	1.70E-05
11/17/1987	Beaver Valley 2	Loss Of Offsite Power	1.70E-05
10/14/1998	Davis-Besse	Reactor Trip With Complications	1.40E-05
11/20/1995	St. Lucie	Emergency Diesel Generator Failure & Potential Failure	1.40E-05
→ 9/11/1995	Limerick Unit 1	Reactor Trip & Clogging Of The Suppression Pool Strainers	1.30E-05
1/12/1994	Calvert Cliffs 2	Reactor Trip With Complications	1.30E-05
10/17/1992	Callaway	Loss Of Main Control Room Annunciators	1.30E-05
3/25/1989	Dresden	Loss Of Offsite Power	1.30E-05
2/8/1994	Point Beach 1	Both Emergency Diesel Generators (EDGs) Inoperable	1.20E-05
2/8/1994	Point Beach 2	Both Emergency Diesel Generators (EDGs) Inoperable	1.20E-05
1/22/1993	South Texas 1	Emergency Diesel Generator & Feed Water Unavailable	1.20E-05
7/14/1998	Big Rock Point	Reactor Operated 13 Years With Borated Water Unavailable	1.10E-05
1/19/1995	Arkansas 2	Single Failure May Disable 2 Emergency Feed Water Trains	1.10E-05
9/25/2004	St. Lucie 2	Loss Of Offsite Power	1.00E-05
9/25/2004	St. Lucie 1	Loss Of Offsite Power	1.00E-05
10/30/2002	Kewaunee	Potentially Unavailable Safety-Related Equipment	1.00E-05
12/3/2001	Callaway	Concurrent Unavailability Of Safety Systems	1.00E-05
9/3/2001	LaSalle 2	Reactor Trip	1.00E-05
8/29/2001	DC Cook 1	Degraded ESW Flow caused Both Unit 2 EDGs Inoperable	1.00E-05
5/16/2001	Calvert Cliffs 1	Auxiliary Feed Water (AFW) Pump Failed	1.00E-05
3/28/2001	Kewaunee	Absence Of Fire Suppression Impacts (AFW) Pump	1.00E-05
8/13/1991	Nine Mile Point 2	Site Area Emergency Due To Electrical Fault & Shutdown	1.00E-05
6/21/1997	Three Mile Island	Failure Of Both Generator Breakers Causes LOOP	9.60E-06
6/19/1997	Three Mile Island	Loss Of Offsite Power	9.60E-06
6/14/2004	Palo Verde 3	Loss Of Offsite Power With Complications	9.00E-06
6/14/2004	Palo Verde 1	Loss Of Offsite Power With Complications	9.00E-06
12/20/2002	Shearon Harris 1	Postulated Fire Could Disable Safety Equipment	9.00E-06
2/5/1998	San Onofre 2	Containment Sump Recirculation Valve Inoperable	7.20E-06
8/14/2003	Indian Point 3	Loss Of Offsite Power Due To Northeast Blackout	7.00E-06
7/19/2002	Indian Point 2	Degraded Control Room Fire Barrier	7.00E-06
8/29/2001	DC Cook 2	Degraded ESW Flow Both Unit 2 EDGs Inoperable	7.00E-06
6/24/1996	LaSalle 1	Concrete Sealant Fouls Cooling Water Systems	7.00E-06

6/24/1996	LaSalle 2	Concrete Sealant Fouls Cooling Water Systems	7.00E-06
6/8/1994	Dresden 2	Improper Settings For Motor Control Center Trips	6.10E-06
8/14/2003	Indian Point 2	Loss Of Offsite Power Due To Northeast Blackout	6.00E-06
12/18/2001	Shearon Harris	Degraded Fire Barrier & Unavailable Safety Equipment	6.00E-06
10/8/2001	Shearon Harris	Both Trains Of Residual Heat Removal Unavailable	6.00E-06
4/23/2001	Surry 2	Emergency Diesel Generator Failed	6.00E-06
4/15/2001	Surry 2	Emergency Diesel Generator Failed	6.00E-06
6/24/1996	Arkansas 1	Loss Of Offsite Power	5.40E-06
5/15/2002	Nine Mile Point 1	Reactor Cooling System Leak Due To Corroded Piping	5.39E-06
8/2/2001	Quad Cities 2	Reactor Trip Due To Failure Of Main Power Transformer	5.00E-06
11/1/2000	Oconee 1	Potential Flooding If Pipe Ruptured In Seismic Event	5.00E-06
3/13/1993	Pilgrim	Loss Of Offsite Power	4.60E-06
5/3/1997	Oconee 3	Two High-Pressure Injection Pumps Were Damaged	4.30E-06
8/14/2003	FitzPatrick	Loss Of Offsite Power Due To Northeast Blackout	4.00E-06
3/7/2003	Nine Mile Point 1	Unavailability Of Cooling System Due To Degraded Piping	4.00E-06
2/26/2003	Kewaunee	Both Emergency Diesel Generators (EDGs) Unavailable	4.00E-06
4/16/2002	Braidwood 1	Inoperable Power Operated Relief Valve Bleed Path	4.00E-06
8/3/2001	Arkansas 1	Inadequate Fire Protection For The Switch Gear Room	4.00E-06
11/1/2000	Oconee 3	Potential Flooding If Pipe Had Ruptured In Seismic Event	4.00E-06
11/1/2000	Oconee 2	Potential Flooding If Pipe Had Ruptured In Seismic Event	4.00E-06
1/16/1990	Dresden 2	Loss Of Offsite Power	3.40E-06
8/4/1994	Dresden 2	Unavailability Of High-Pressure Coolant Injection. (HPCI)	3.10E-06
5/5/2004	Dresden 3	Loss Of Off Site Power Due To Breaker Malfunction	3.00E-06
1/30/2004	Dresden 3	HPCI Potentially Unavailable	3.00E-06
1/30/2004	Dresden 2	HPCI Potentially Unavailable	3.00E-06
9/15/2003	Peach Bottom 3	Loss Of Off Site Power & EDG Unavailable Relief Valve	3.00E-06
3/25/2003	Palisades	Loss Of Off Site Power And Loss Of Shutdown Cooling	3.00E-06
7/1/2002	Hope Creek 1	Station Service Water Train "A" Traveling Screen Failed	3.00E-06
5/30/2002	Oconee 3	Unavailability Of HPI Pump During LOOP or HELB	3.00E-06
4/23/2001	Dresden 3	Alert Declared, Loss Of Containment Cooling & Manual Trip	3.00E-06
7/5/2001	Dresden 3	HPCI Inoperable Due To Water Hammer Event	3.00E-06
4/23/2001	Surry 1	Emergency Diesel Generator Failed	3.00E-06
3/28/2001	Fermi 2	Emergency Diesel Generator Was Inoperable > 7days	3.00E-06
→ 2/23/2001	Limerick 2	Manual Trip Due To Main Steam Relief Valve Failed	3.00E-06
9/1/1996	Haddam Neck	Seized RHR Pump Was Vulnerable To Failure Since 1987	2.90E-06
3/16/2004	Peach Bottom 3	HPCI Unavailable Due To Failed Flow Controller	2.00E-06
9/29/2003	Waterford 3	Degraded EDG Due To Failed Fuel Line	2.00E-06
3/6/1996	McGuire 2	Emergency Diesel Generator Declared Inoperable	1.80E-06
11/3/1994	Turkey Point 3	Reactor Electrical Load Sequencers Periodically Inoperable	1.80E-06
1/3/1994	Turkey Point 4	Reactor Electrical Load Sequencers Periodically Inoperable	1.80E-06
2/12/1998	Oconee 1	Refueling Water Storage Tank Errors Impair Core Cooling	1.70E-06
2/12/1998	Oconee 2	Refueling Water Storage Tank Errors Impair Core Cooling	1.70E-06
2/12/1998	Oconee 3	Refueling Water Storage Tank Errors Impair Core Cooling	1.40E-06
7/24/2002	Seabrook	Reactor At Full Power With Emergency Diesel Inoperable	1.30E-06



The Mercury

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Pottstown, Pennsylvania

Radiation released at Limerick plant

By John Gentzer
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LIMERICK — Radiation was released into the air Thursday morning inside the area housing the Limerick Generating Station's Unit 2 nuclear reactor, officials disclosed Friday afternoon.

The radiological contamination, described as minimal by plant officials, was detected while workers were cleaning the inside of the reactor vessel during the facility's annual refueling and maintenance outage, according to a brief statement issued Friday by Exelon Nuclear, the company that operates the Limerick plant.

About 60 people were on the refueling floor in the reactor building when the contamination was released, but only eight workers were exposed to the radiation, plant spokeswoman Lisa Washak said.

All were examined, and there "were

no injuries or illnesses as a result," she added. But "as a precaution, we'll continue to monitor the workers who were in the area."

Exposure to the workers was determined to be less than 10 millirems. A millirem is a measure of radiation.

For comparison's sake, annual exposure limits set by the Nuclear Regulatory Commission for individuals working with radiation is 5,000 millirems, and the employees at the Limerick Generating Station, during an average year, are exposed to roughly 180 millirems; when compared with those figures, the 10 millirems released Thursday morning was "incredibly minuscule," Exelon spokesman Dave Simon said.

And it "wasn't considered an acutely high dose of radiation," Washak added.

"Still, we take what happened very seriously. Our top priority is the safety of our workers and the community, but

from a radiological perspective, this was a very minimal event," Washak said.

After the radiation sirens went off and workers evacuated the area, radiological surveys were conducted, and the affected area was decontaminated, as per standard operating procedures. Outage work resumed later Thursday afternoon. The entire incident lasting roughly seven hours, Washak said.

In the nuclear industry, exposure to some radiation is an inherent risk.

"It's an occupational occurrence," Washak said. "We try to keep it as low as reasonably achievable. Limerick has one of the lowest rates for" occupational radiation exposure.

No contamination was released from the area, Washak said, "meaning nothing seeped into the environment."

Exelon officials are continuing to investigate the cause of the incident, Simon said.



Valve malfunction forces shutdown of Limerick's Unit 2

10-14-05

By Mike Castiglione

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LIMERICK — Exelon's Limerick Generating Station had an unexpected automatic shutdown of Unit 2 at 10:30 p.m. Wednesday, according to officials.

"The shutdown was due to a valve malfunction in the plant's turbine generator," Site Communicator Beth Rapczynski said.

The malfunction occurred in the "non-nuclear" portion of the plant.

"Everything with the shutdown was done properly and safely, as expected," Rapczynski said. "Unit 1 continues to operate and produce safe, clean, reliable energy."

According to Rapczynski, there are no safety concerns for nearby residents. As of Thursday evening, Unit 2 continued to be shut down. Citing policy with "proprietary information," Exelon officials do not indicate exactly when the plant will again be up and running.

Unit 1 and Unit 2 were both ranked first in the nation by General Electric for its efficiency. GE, which built both generating units, also recognized Unit 1 and Unit 2 among the elite "boiling water reactors" in the world. At the same time, this is the Limerick plant's third unexpected shutdown since March.

In March, after a scheduled refueling outage to conduct maintenance to Unit 2, the plant had to be shut back down two days after it came back online due to a high temperature reading on a turbine bearing. Crews investigated and found damage to the bearing. Workers repaired the damage and the plant was

functioning normally seven days after it shut down.

In July, Unit 1 underwent an unexpected automatic shutdown because of a trip in the electrical distribution area of the plant. The plant is set up to shut down in cases where there is a trip. The shutdown happens within seconds of initiation.

Back in April, the generating station received high marks from the Nuclear Regulatory Commission during its annual performance assessment, meaning there were very low safety issues and only baseline inspections would be conducted by the NRC during the current year. The NRC is notified by plant officials whenever there is an unexpected automatic shutdown.

Limerick cooling tower shuts itself down

7-26-03
By Mike Castiglione
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LIMERICK — Peering out at the cooling towers of Exelon's Limerick Generating Station, observers may notice that since Monday morning steam has only been pouring out of one of the units.

At about 10 a.m. Monday, Unit 1 underwent an unexpected automatic shutdown because of a trip in the electrical distribution area of the plant, officials said.

"We have had automatic shutdowns in the past, but our record of operation continues to be one of the best in the industry," said Beth Rapczynski, spokeswoman for the plant.

Although Unit 2 is running at full power, Unit 1 continued to be shut down Tuesday. Officials did not release a time period for when Unit 1 would be up and running, a policy plant officials uphold when dealing with "proprietary information." However, Tuesday

evening, officials did confirm that Unit 1 was starting back up, a process that takes considerably longer than the time it takes to shut down.

According to Rapczynski, there is nothing for area residents to worry about with respect to the cooling tower being shut down. "There was no release of radiation, nor were there any injuries to any employees during the process," Rapczynski said. "Unit 1 was shut down properly and safely. There are no issues, everything went as expected."

Rapczynski said the plant is set up to shut down in cases where there is a trip. The shutdown happens within seconds of initiation.

In April, the plant received high marks from the Nuclear Regulatory Commission during its annual performance assessment, meaning there were very few safety issues.

Plant officials did confirm that the NRC was notified Monday of what was going on.

Rapczynski, when asked if Monday's shut down, or the subsequent response to the situation, would have any effect on the NRC's evaluation, replied, "The NRC will look into it. They look at many different aspects when they conduct the assessments. It's up to them how they handle it."

The Mercury was unsuccessful in attempts to reach the NRC for comment.

This is the second time in recent months that one of the towers had to be unexpectedly shut down. In March, after a scheduled refueling outage to conduct maintenance to Unit 2, the tower had to be shut back down two days after it came back online due to a high temperature reading on a turbine bearing.

Crews investigated and found damage to the bearing. Workers repaired the damage and the plant was functioning normally seven days after its shutdown.

No radiation released in accident, Limerick nuke plant officials say

2/7/03
Mercury Staff Report

LIMERICK — Two fuel bundles fell onto the refueling floor at Exelon Nuclear's Limerick Generating Station Jan. 30 while workers were organizing materials to prepare for an annual refueling outage this spring.

The fuel assemblies are transported horizontally in large containers, and workers were lifting a container into a vertical posi-

tion for storage when the accident occurred, according to company officials.

No one was injured, and the refueling floor was temporarily evacuated (per plant policy), but there was no release of radiation, officials said.

Each fuel bundle, which costs roughly \$200,000, weighs approximately 700 pounds and contains 100 fuel rods.

Main break forces Limerick plant to pump river water into towers

9-17-82

By John Gentzel

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LIMERICK — A water main ruptured Wednesday afternoon at the Bucks County pumping station that feeds water to the Exelon Nuclear Limerick Generating Station, officials announced.

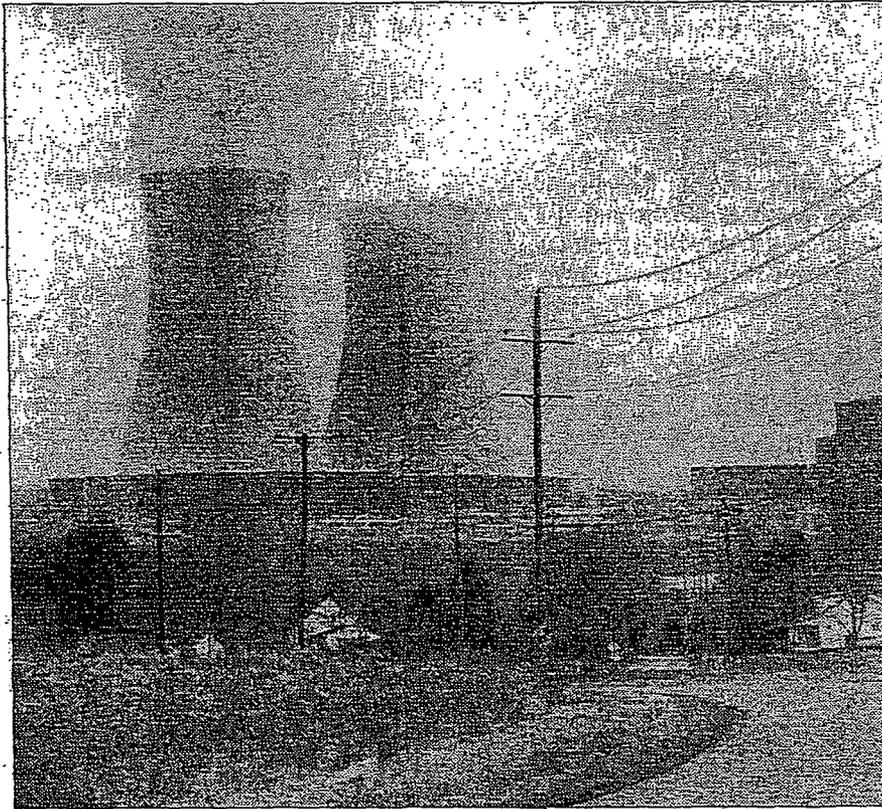
Residents living near the pipe, which supplies water from the Point Pleasant pumping station in Plumstead, Bucks County, to the Bradshaw Reservoir and subsequently down to Limerick, reported the leak to officials shortly after noon Wednesday, said Exelon spokeswoman Lisa Washak.

The water is used in the plant's cooling towers — not in the reactor — and there was never a safety concern, Washak said.

"This situation had no impact on plant safety or power generation" because the Bradshaw Reservoir had "more than enough water in it to continue serving" the site, Washak said.

The power plant takes water from the Point Pleasant pumping station from mid-spring to mid-fall, drawing water during the winter (when the water's temperature is cooler and the flow level higher) from the adjacent Schuylkill

(See LIMERICK PLANT on A3)



Mercury file photo

The twin cooling towers of the Limerick Generating Station can be seen for miles around. Plant operators said they had to use water from the Schuylkill River for the cooling towers when a water main break was detected in Bucks County. The water in the reactor units was not affected.

Main break forces Limerick plant to pump river water into towers

(LIMERICK from A1)

River.

Plant officials made the decision late Wednesday afternoon to start pumping water in from the Schuylkill, and also decided to release extra water from another backup reservoir in Tamaqua, officials said.

Exelon crews were out at the scene with the local water company to help evaluate the leak and to assist in making the needed repairs, Washak said. Depending on the extent of the break

and the parts needed to fix the problem, repairs could take days or weeks, officials said.

"There is no danger to the public as the plant has other water sources," said Diane Screnci, a spokeswoman for the Nuclear Regulatory Commission.

"This is not what we call a formally 'notifiable incident,' but (Exelon) did notify us as a courtesy. We have resident inspectors, that's where they go to work every day, so they'll keep us informed of the situation," Screnci said.

Nuke plant admits mistake in disposal of radioactive waste

3-15-02
By John Gentzel

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LIMERICK — The discovery of low-level radioactive waste from Limerick's nuclear power plant being dumped at the Pottstown Landfill was nothing more than a big mistake, according to the company that operates the plant.

"This was certainly a significant event," Exelon Radiation Protection Manager Jamie Mallon said Thursday afternoon.

"We're charged with protecting our workers and the public, and we do recognize that this is part of our charter, to keep this (material) away from people."

Mallon added that as the facility undergoes its annual outage and refueling process, the way the low-level waste is disposed of was modified, and "some people didn't perform (their jobs) properly."

"There was significant personnel error," he added.

Even though the amount of radiation emanating from the five bags of waste found Monday at the landfill was less than what someone would be exposed to while receiving an X-ray, the waste cannot be disposed of like normal trash.

"We take this material, put it in bright yellow bags to isolate it from the mainstream (trash)," Mallon said.

However, instead of being placed in

the trash bin for delivery to a landfill in Barnwell, S.C., where all low-level radioactive waste is taken, it was "inadvertently placed in the wrong" bin, Exelon spokesman Dave Simon said.

When asked if a mistake like this has ever happened before, Mallon replied "no."

"To the best of my knowledge, no," he said.

(See DISPOSAL MISTAKE on A4)

Nuclear plant admits disposal mistake

(DISPOSAL MISTAKE from A1)

"That's because we design the process to make sure it doesn't happen, and part of this is how we label the material," Mallon said.

In this case, however, the bright yellow bags weren't enough to keep the crews at the power plant from putting the waste into the wrong bin.

Simon said the company has reviewed proper radiological controls with its key personnel, and for the foreseeable future,

work at the disposal bins will be monitored daily by the facility's radiation protection crews.

We "set it up so supervisors or a foreman will be present as we" move the material, Simon said.

As for the events of Monday when the bags were discovered, "everyone did what they were supposed to do in a situation like that," Simon said.

"The Pottstown Landfill folks promptly let the DEP (state Department of Environmental

Protection) know what was going on," Simon added. "We immediately sent staff to the landfill, and immediately returned the bags to Limerick."

Officials: Radioactive waste left at landfill

Officials: Radioactive waste left at landfill

3-14-02
By Evan Brandt
ebrandt@pottsmmerc.com

POTTSTOWN — The state and the Nuclear Regulatory Commission are investigating the discovery at the Pottstown Landfill of five bags of trash containing radioactive waste from the nuclear power plant in Limerick.

John Wardzinski, district manager for the landfill's owner, Waste Management Inc., said some landfill workers saw the five bags with the radiation symbol being unloaded from a BFI trash truck late Monday morning.

"They knew which vehicle it had come from, and they immediately stopped the truck, and we called the (Department of Environmental Protection) and the NRC," Wardzinski said.

"We identified that the material came from the Limerick Nuclear Generating Plant," he said.

Ron Ruman, an information specialist with the DEP's central office in Harrisburg, said the bag contained "gloves and tape used in an area which gets exposed to radiation, so there was a residual amount (of radiation) on the material."

He said tests conducted on the material showed a very low level of radioactive contamination.

"Let's put it this way. The highest reading was .35 millirems per hour. That's extremely low. One chest X-ray is 10 millirems per hour, so that's 30 times as much as what we had here," said Ruman.

"There was no danger to anyone or to the public," said Ruman.

"After they were tested, the bags were put in other bags, carted away, and put in a secure area and stored at the nuclear facility," he said.

He directed questions about the size and contents of the storage facility at the nuclear plant to the Exelon Energy, which owns and operates the plant.

Calls to plant spokeswoman Lisa

(See RADIOACTIVE WASTE on A4)

(RADIOACTIVE WASTE from A1)

Washak were not immediately returned Wednesday.

Although Ruman said he did not know how much low-level radioactive material is stored at the nuclear plant, he repeatedly emphasized the new measures the nuclear plant has taken to ensure the incident is not repeated.

"They're going to ratchet up their security to make sure this doesn't happen again," said Ruman.

In a press release issued after office hours Wednesday, Joseph Feola, director of the DEP's Southeast Regional Office in Conshohocken, said the plant will "double-check all trash shipments going out of the plant."

No unscheduled trash removals will be allowed in the future, Ruman explained.

The plant will also now conduct "radiation checks" of all trucks leaving the plant, said Ruman.

"It was simply five bags in a large load of trash and they were hidden inside, so BFI is probably pretty close to blameless in all this," said Ruman.

Despite his extensive knowledge of the plant's new security procedures, Ruman said he would "not want to speculate" on the likelihood that similar incidents have occurred in the past without being detected.

He said the investigation being conducted jointly by the DEP and NRC will deal exclusively with this latest incident and not explore the possibility that incidents like this have occurred before.

"We consider this to be important even though the level of radiation was so low, but we have no reason to believe it has happened before," said Ruman.

Ironically, the detection of the radioactive material by landfill workers occurred before the landfill's plan to test for radiation has gone into effect.

In December, landfill officials submitted an application to DEP to scan incoming trash trucks for radiation before they unload into the landfill.

Regulations require the new plans and the equipment, but the system has not yet been implemented, said Wardzinski.

"Our people are trained and our system worked as planned," he said.

The Mercury



A6

Roses and Thorns 3-15-02

Thorns to plant for putting nuke waste in the trash

THORNS to the Limerick Nuclear Generating Station for taking its nuclear waste out with the trash. The state Department of Environmental Resources and the Nuclear Regulatory Commission are investigating the discovery at Pottstown Landfill of five bags of trash containing radioactive waste from the plant at Limerick. According to the Department of Environmental Protection, the bags contained gloves and tape used in an area that gets exposed to radiation, and the residual amount of radiation on the material was very low. The DEP spokesman said the agency, along with the NRC, was treating the incident as a one-time event with "no reason to believe it has happened before." Well, there's no reason to think it hasn't happened before, either. We suggest the power plant separate its radioactive materials before they get into the trash. The power plant managers say the incident was a big mistake. We certainly agree with that. An even bigger mistake would be if something similar happens again.

NRC finds minor violation at Limerick Generating Station reactor

Mercury Staff Report

LIMERICK — The Nuclear Regulatory Commission recently found a minor safety violation at Exelon Nuclear's Limerick Generating Station.

The finding involved a valve at the nuclear power plant's Unit 2 reactor, and the commission said it considers the violation to be of "low to moderate" importance.

The valve in question discovered during an inspection conducted between September and November of last year. The violation has to do with the facility not having adequate measures in place to identify that one of the plant's safety/relief valves was in a degraded condition and was vulnerable to not reclosing after opening.

(Safety/relief valves are used to control temperatures and pressures in

nuclear power plants' cooling systems).

Specifically, Limerick personnel had been had been tracking the temperature of the questionable valve, with a plan to repair or replace it if the component's temperature dropped below a certain temperature.

An analysis showed that the valve might not have closed had it opened below a certain temperature.

However, on two occasions, the tem-

perature did drop below the threshold level, resulting in what the commission described as an "actual condition adverse to quality." But the condition was not identified until Feb. 23, 2001, when the valve opened and did not immediately close.

The commission issued a Notice of Violation to Exelon for not having adequate measures in place to identify the adverse conditions.

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1-29-2002 The Mercury



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NRC finds minor violation at Limerick Generating Station reactor

Mercury Staff Report

January 29, 2002

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Reader Opinions

Electrical malfunction shuts down Limerick Unit 1

By ERIK SCHWARTZ
Mercury Staff Writer

4/22/99

LIMERICK — Unit 1 at the Limerick Generating Station shut down automatically Tuesday night after an unexplained electrical malfunction, PECO Energy Co. officials reported.

"Control-room operators responded appropriately to problems that cropped up when the auto-trip occurred," said U.S. Nuclear Regulatory Commission spokesman Neil A. Sheehan. "They were able to safely shut the plant down."

The nuclear reactor remained off Wednesday "in a safe and stable condition while plant personnel determine the cause of the problem," PECO said in a statement.

The malfunction does not appear related to the Year 2000 computer glitch, Sheehan said.

Jim von Suskil, the PECO vice president in charge of Limerick, said Unit 1 may remain shut down for "a matter of days."

A system for maintaining reactor-water purity stopped working properly after an electrical problem occurred in the circuitry. The unit shut down automatically, as designed.

After the shutdown, several equipment malfunctions occurred, which the NRC and PECO are investigating. A circuit breaker failed to open and a vacuum pump did not start, an agency statement said.

On Saturday, Limerick Unit 2 began a planned six-week refueling and maintenance outage, including a major turbine replacement and more than 13,000 maintenance activities. A third of the unit's fuel bundles will be replaced.

The Unit 2 project involves about 2,800 PECO workers and contractors.

June, 1999

The Net Works

Another Close Call: Limerick

On April 20, All 8 valves in a condensate system in Unit 1 failed "possibly due to a computer malfunction." The reactor vessel water level dropped significantly, from a normal level of +35 inches to a low level of -75 inches (the top of the active fuel is -161 inches). In other words, there are 196 inches of water keeping the fuel rods from being exposed to the air, causing a meltdown. 56% of this water was lost during the accident, leaving us 86 inches away from disaster. The low level of -75 inches occurred only 40 seconds into the "event." At that rate, if the conditions were not corrected in time, it would have been less than 2 minutes before water failed to cover the nuclear fuel:

According to the Nuclear Regulatory Commission's report, there was no release of radioactive material. For a copy of the NRC's event report, visit the NukeNet list archives at: <http://www.egroups.com/group/nukenet/3002.html?raw=1>

Penna. is 2nd in number of nuclear reactors (Illinois is 1st) and *none* of them are Y2K-compliant (and *none are being required to be compliant by the NRC*). Considering how unsafe these reactors are normally, additional Y2K troubles pose a serious threat to public safety. Limerick's event was blamed on a 'possible' computer malfunction. In February, Peach Bottom reactor in York Co., experienced a 7-hour lockup of the plant's primary and backup plant monitoring system computers during Y2K testing. Given that Y2K may cause the electrical power grid to be unreliable, all that we have to depend on are the (usually diesel) backup generators to keep the reactors from melt-

(Continued on page 9)

The Limerick nuclear reactor in Montgomery County, PA had an accident on April 20th, 1999.

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Pennsylvania has the 2nd highest number of nuclear reactors next to Illinois. None of them are Y2K-complaint yet (and none are being required to be compliant by the NRC). Considering how unsafe these reactors are normally, additional Y2K troubles pose a serious threat to public safety. The Limerick accident was blamed on a 'possible' computer malfunction. In February, the Peach Bottom reactor in York County, PA experienced a 7 hour lockup of the plant's primary and backup plant monitoring system computers during Y2K testing.

Given that Y2K may cause the electrical power grid to be unreliable, all that we have to depend on are the (usually diesel) backup generators to keep the reactors from melting down. These backup generators are not very reliable. In fact, on March 31st, it was reported that the Seabrook reactor in New Hampshire likely had both generators inoperable at the same time (one may have been inoperable for over a year). Should events like this occur while there is a power outage, it's only a matter of time until the fuel pools cannot remain cooled and can melt down.

A copy of the NRC event report on Seabrook can be found in the Y2K-Nukes list archives at: <http://www.egroups.com/group/y2k-nukes/29.html?raw=1>

More info on Y2K & nuclear power can be found at: <http://www.nirs.org/y2k/y2kandnuclearpowerwebpage.htm>

Specific info on backup generator failures can be found at <http://www.nirs.org/y2k/Y2KApdxA.htm>

To receive regular emails on nuclear or Y2K-specific nuclear topics, visit the NukeNet website and use the form to subscribe to the NukeNet or Y2K-Nukes lists: <http://www.enviroweb.org/nukenet/>

Limerick Unit 1 returns to full power

LIMERICK - Unit 1 at its Limerick Generating Station is back at full power generating 1,134 megawatts (mw) of electricity after completing a five day maintenance outage. PECO officials said Limerick Unit 1 reconnected to the power grid at 2:49 p.m. Sunday and reached full output late Monday afternoon under a gradual power ascension. The unit was shut down at 6:32 p.m. Tuesday, April 20, due to an equipment malfunction. Unit 2 at Limerick is in the 10th day of a biannual scheduled refueling and maintenance outage.

POTSDOWN, PA MERCURY

at Limerick; no *Phila Inquirer* peril, PE says

By Dan Stets
Inquirer Staff Writer

Radioactive fuel is leaking from the reactor of Philadelphia Electric Co.'s Limerick 1 nuclear power plant in Montgomery County, causing a reduction in the electrical output of the generating station, the company said yesterday.

The leak poses no safety hazard, but fixing the problem at Limerick 1 and making sure it does not occur at PE's three other nuclear reactors is expected to cost a total of \$80 million, Corbin A. McNeill Jr., PE's executive vice president for nuclear operations, said.

The plant could be operating at less than full power for more than two years until the leak is fixed, forcing PE to buy more expensive replacement electricity from neighboring utilities.

The leak has spread radioactive contamination into the cooling system of the Limerick boiling-water reactor and has resulted in the release of very small amounts of radioactive gas into the atmosphere, McNeill said.

The situation poses "no danger" either to people living around Limerick or to workers at the plant, McNeill said. The radioactive isotopes released into the atmosphere decay within minutes or hours, he said.

Meeting with NRC

PE executives discussed the leak yesterday with officials of the Nuclear Regulatory Commission during a meeting called to review the NRC's latest report on Limerick's performance.

In general, the NRC officials praised PE for operations at Limerick and credited the company with identifying problems at the plant and moving to correct them.

However, NRC Regional Administrator William T. Russell told PE officials that they should repair the fuel leak before the radioactive contamination within the various systems at Limerick becomes so extensive that it is nearly impossible to remove.

Russell said similar problems at other reactors in the United States had been allowed to go on so long that correction became extremely difficult. McNeill assured Russell that he knew the problem had to be fixed.

Until repairs are made, PE will

electricity, but said he had no estimate of the total bill.

PE spokesman Neil McDermott said the Limerick-1 plant had been operated performance far above the average of 65 percent for boiling-water reactors.

"Basically, this [leak] is just, if you will, a normal event in the day-to-day operation of a boiling-water reactor," said McDermott.

The Pennsylvania Public Utility Commission will have to determine whether PE or its ratepayers should bear the cost of the replacement power when it reviews the company's energy costs, McDermott said.

According to the NRC report on Limerick, dated July 7, the fuel leak was discovered on March 25 when higher radiation levels were detected at the plant.

The NRC report said the radioactivity level within the reactor's coolant system increased by "a factor of about 10" because of the leak.

McNeill said yesterday that the level of radioactive gas released from the plant was about one-tenth of the amount permitted by the NRC.

Fuel-rod problem

Russell, the NRC administrator, agreed that the atmospheric release was extremely small and posed no danger to the public. Present contamination within the cooling system also is about 10 percent of the permitted level, Russell said.

According to McNeill, the problem developed when one of the 75,000 fuel rods in the plant became contaminated with copper from tubing within the plant's power system. The copper caused corrosion on the outer surface of the fuel rod, he said. The rods are 12-foot-long zirconium tubes filled with uranium pellets.

As a result of the corrosion, a hot spot developed within the rod, McNeill said. That heat caused a microscopic crack through which uranium isotopes — waste produced by the nuclear fission within the rods — escaped into the coolant fluid that surrounds the fuel rods, he said.

The long-term solution is to replace the condenser that contains the copper tubing with one that has titanium tubing, McNeill said. The new condenser will cost \$20 million.

In the short run, the company intends to take interim measures, including improving the plant's coolant-filtration system and using a

or pipe — would develop throughout the plant's cooling system. That could lead to the release of radioactivity within the plant, endangering maintenance workers with radioactive contamination, he said.

Prevention issue

"The issue is one of prevention," said Russell. "It is not an issue with release to the public. It is a concern with a contamination problem within the facility."

In its latest report on Limerick's performance, the NRC said the problem was unusual in a plant as new on Feb. 1, 1986.

The NRC said in the 45-page report that PE's response would be significant for "the longer-term operation

why the problem developed so quickly at Limerick," he said. The Limerick 1 condenser will not be changed until late 1990 at the scheduled refueling, he said.

PE spokesman McDermott said the company considered the \$80 million a capital expense.

"Let's face it," he said. "We don't live in a perfect world. Large plants of any type have mechanical problems."

The Alliance For A Clean Environment
1189 Foxview Road
Pottstown, PA 19465

April 11, 2011

Paul Krohn, NRC Branch Chief
Nuclear Regulatory Commission, Region 1
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Mr. Krohn,

The disaster in Japan caused nuclear reactors to leak radiation at dangerous levels. That nuclear disaster highlights the risks millions of residents face in the event of a similar catastrophe at Limerick Nuclear Power Plant.

The Nuclear Regulatory Commission (NRC) identifies Limerick Nuclear Plant as 3rd highest risk of catastrophic failure due to an earthquake out of 104 in the U.S. But an earthquake is just one of several things that cause a Limerick nuclear disaster.

The Japan nuclear disaster was caused by loss of cooling water which could also be caused by:

- ✓ Loss of power - Limerick back-up power is inadequate (only hours, not days).
- ✓ Fire - Limerick is not following the safest fire safety regulations.
- ✓ Terrorist Attack - Limerick is not required to guard against a 9/11 type terrorist attack with a plane or missile.
- ✓ Accidents Happen - Through Mechanical Breakdown and Human Error - i.e. Chernobyl, TMI

NRC cannot guarantee that a disaster will not occur at Limerick. Given the catastrophic consequences of a Limerick disaster, NRC's "confidence" and "expectations" that Limerick Nuclear Plant is "safe enough" are no longer good enough. Prevention and Precaution are imperative. We need NRC to:

1. Require back-up power for several days.
2. Require the safest, most protective fire safety procedures.
3. Stop allowing Exelon to remove fuel rods from the pools before the required 5 years.
4. Require Exelon to guard against a missile or air strike by plane causing fire from fuel.
5. Require more on site water storage. There is no ocean to keep Limerick's fuel rods and reactor cooled down for days or weeks. The only body of water near Limerick is the drinking water source for almost 2 million people.

We must also have an expanded evacuation zone in the event the worst happens. Americans in Japan within 50 miles of the Fukushima nuclear reactor were advised to evacuate. It is obvious that a 10-mile evacuation zone around Limerick Nuclear Plant was a political decision that is woefully inadequate. A 2006 report compiled from NRC records shows that Limerick is one of the nuclear plants with substandard containment, which means more radiation would be released. Being a GE Mark 2 design, it is even similar to the reactors in Japan.

Nearly 8 million people live within 50 miles of Limerick Nuclear Plant, but there are no plans for a 50-mile evacuation. Philadelphia is just 21 miles away. Is such an evacuation even conceivable?

Our entire region's residents are already continuously exposed to Limerick Nuclear Plant's routine radiation emissions and now Japan's radioactive fallout. Logic tells us that the additive, cumulative, and synergistic impacts from the broad range of radionuclides from all routes of exposure to which we are exposed could be harmful, especially to the most vulnerable among us, the children, sick, and elderly.

It is deceptive and even shameful to suggest we are safe from Limerick or Japan's low-level radiation because we are continuously exposed to background radiation, planes, bananas, etc. Those are additive doses, which make us more at risk from Limerick and Japan's so-called low levels of radiation, not less.

The National Academy of Sciences Report, as well as Physicians for Responsibility, say there is no safe level of exposure to radiation. Immediately after the Japan disaster started, NRC simply raised permissible radiation dose limits from 360 millirems per year to 620 millirems per year, legally sanctioning increased radiating harm. Limits were previously raised after Chernobyl from 80-100 millirems per year to 360 millirems per year. Obviously, permissible does not mean safe. It would be far more helpful if NRC would work on programs to teach people ways they could reduce harmful impacts from these unacceptable radiation exposures.

NRC has a responsibility to keep our beautiful region from becoming permanently uninhabitable, with its soil, vegetation, and water supplies contaminated for generations to come. We urge immediate action on the safety procedures listed above to protect our homes and families. Increased prevention and precaution are imperative.

Respectfully,

Dr. Lewis Cuthbert
ACE President

CC: Senator Bob Casey
Senator Pat Toomey
Congressman James Gerlach
Congressman Charles Dent
Governor Tom Corbett
PA Senator John Rafferty
PA Senator Andrew Dinniman
Philadelphia Mayor Nutter
Representative Tom Quigley
Representative Mike Vereb
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